PLATE 7

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OPHTHALMOSCOPY WITH YELLOW-GREEN LIGHT.* VISIBILITY OF THE RETINAL CAPILLARIES.

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In the paper published in the December number (v. 7, p. 940) is explained the method of securing such light. The capillaries of the retina are thus rendered visible.

In a previous communication the writer has given the reasons why he prefers light of a limited spectral range and of yellow and green color to the "red free" light of Vogt. On ophthalmoscopy with this light details of the fundus can be seen which are wholly invisible in ordinary white or yellow light. The fundus, as a whole, appears bright grass green. The macula somewhat more yellowish; the blood vessels stand out sharp and black, and their finer ramifications can be seen in astonishing detail. In areas of the fundus, which on ophthalmoscopy with white light appear to be quite free from blood vessels, one sees innumerable fine dark lines, so fine as to be almost at the limit of vision, but nevertheless in this harsh illumination quite clearly visible. Some of these fine lines are seen to be connected with small branches from the arteries; some with small branches from the veins,

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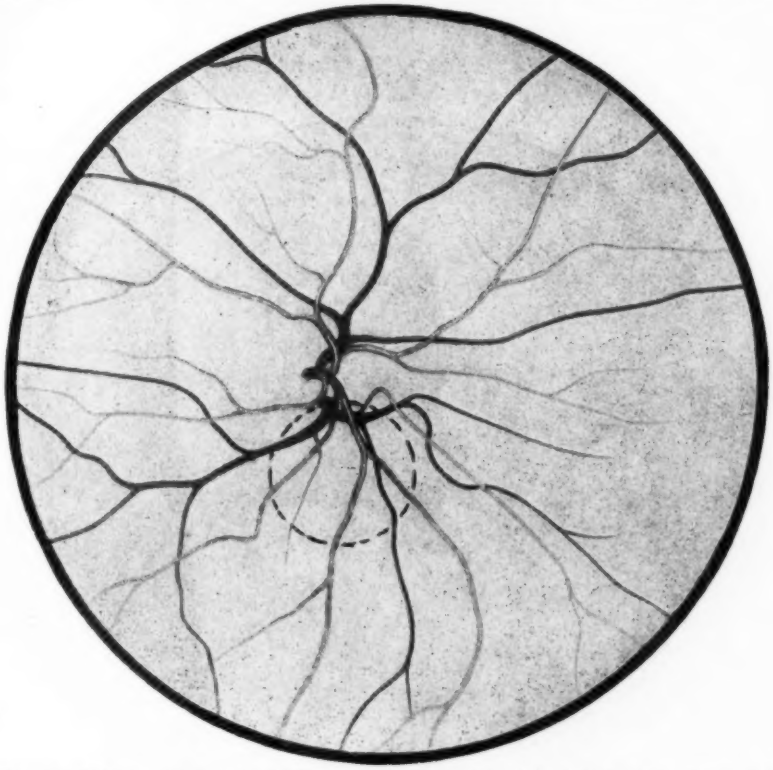

Fig. 3. Diagram of the retinal vessels shown by a postmortem injection of India ink. The area within the dotted circle is shown under higher magnification in Fig. 4 and 5.

Fig. 4. India ink injection of the retinal capillaries.

Fig. 5. Same as Fig. 4 with the superficial capillaries omitted. Not all the capillaries are injected.

some are seen in the intervening space, their connections with the remaining vascular tree being obscured by the overlying nerve fibers. Occasionally it is possible to trace a direct connection from artery to vein thru these fine lines.

It was hard even at first consideration to avoid the notion that these fine lines must represent the retinal capillaries. Assuming the average diameter of the capillaries to be from seven to ten micra, these should appear under the magnification of fifteen times, with which one sees the ophthalmoscopic picture, as from 1/10 to 15/100 mm. in diameter, and there is no reason why, if our optical system is sufficiently perfected, we should not be able to see them quite distinctly. In order to confirm this interpretation, injections of India ink were made into the carotids of several cadavers. The eyes of these cadavers were then removed, fixed in formalin, and subsequently the retinas were removed, cleared in glycerin, and studied under the microscope. It then appeared that the retinal capillaries undoubtedly correspond in distribution and size relative to the larger vessels, exactly to the fine lines seen in the ophthalmoscopic picture. There can be no doubt, therefore, that by abolishing the chromatic aberration of the eye, and by choosing light of the proper wave length, one can, with the aid of an ordinary reflecting ophthalmoscope, see the capillaries of the living retina.

A study of the injected specimens brought out a further point of interest which does not seem to have been previously noted, namely, that the capillaries of the retina form two clearly distinguishable nets. The more superficial net lies in the layer of nerve fibers and the capillaries here tend to run in a direction parallel to that of the nerve fibers, with short connecting bridges running perpendicularly. The deeper layer is largely independent of the superficial one, connected with it only here and there by widely separated channels. It is much more irregular in pattern. It lies mainly in the inner nuclear layer of the retina, but sends occasional loops both up toward the layer of ganglion cells and down toward the nuclei of the rods and cones.

SECONDARY CATARACT OPENING BY SINGLE STRAIGHT INCISION. IRIDOTOMY BY SAME METHOD.

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It is urged that a single straight incision in the membrane will give a permanent opening sufficient for purposes of vision. A knife is described for making such an opening and the technic of using it. Iridotomy may be done in the same way. Examination with the microscope shows the effects of such operations upon the anterior vitreous. Read before the American Academy of Ophthalmology and Oto-Laryngology, Montreal meeting, September, 1924.

Unfortunately, many surgeons of large experience consider division of after cataract difficult in the extreme. Dread of this operation has had an influence in leading some ophthalmologists toward the adoption of intracapsular cataract extraction. I think there is quite general agreement now that the degree of security which the posterior lens capsule affords during cataract extraction is well worthwhile, and that capsulotomy extraction is the wise choice for most ophthalmologists. So suggestions for handling secondary cataract are not out of place. A suitable operation for division of a secondary membrane must offer a good chance for a permanent opening in the visual line, and it must offer the possibility of only very slight traumatism to the eye. It must be an operation which one can approach without dread, but with confidence that a satisfactory opening will result. Familiarity with a definite and effective technic is an important requisite, and it is my purpose to attempt to make clear a procedure which I have practiced for

years and which a surgeon can rely on to give sufficient permanent opening in after cataract, offering to the eye the least possible trauma.

D. W. Hunter developed a clever technic for opening a secondary membrane, and with it won the admiration of all who saw him operate. He used a ground down Graefe knife, and got a long, clean opening, by sliding the blade on the membrane in a single rapid act of supination of the forearm. The results were sure and beautiful, but fear of slashing the cornea kept most surgeons from attempting the trick, and only a few emulated him successfully. The method which I wish to advocate is unbelievably simple and safe, and it offers the same sort of results which Hunter obtained.

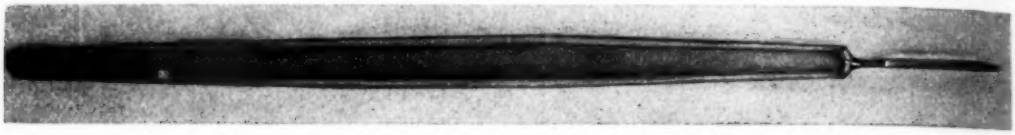

Fig. 1. Discission knife for after cataract. Blade is 18 mm. long and 1 mm. wide.

The Knife. The surgeon should have something better than a worn down cataract knife for making an incision in after cataract. The blade should have a keen point and a faultless edge, and it should be accurately shaped. The instrument I use has a blade 18 mm. long and 1 mm. wide at its widest part. It is carefully tapered and sturdy enough so that it will not bend. The edge is ground sharp thruout the length of the blade. Figure 1 illustrates the knife.

Technic. Let us assume that there is a coloboma above, from iridectomy, and that the pupil is dilated. The technic must be modified if only a short incision is wanted. The surgeon stands at the head of the table and a little to the left of the eye to be operated on. The speculum is introduced and the eye is fixed by grasping the conjunctiva and subconjunctival tissues below the cornea at a point diametrically opposed to the point where the knife is to enter the cornea. The fixation forceps is held in the left hand without the slightest pressure on the eyeball. The handle of the knife is taken most delicately between the pulps of the forefinger and thumb of the right hand 2 inches (50 mm.) from the knife point, and care is taken that there is no tendency for the finger to wrap itself around the handle. This would render the execution of the technic impossible. The insert (c) in figure 2, is intended to show how the fingers are placed on the sides of the knife handle, two inches from the point.

The eye looks slightly downward and the point of the knife enters the upper part of the cornea, 1 mm. from the limbus, in front of the coloboma. The incision should be planned so as to go thru the heaviest bands if possible, but the bands can be cut at any angle and it is well to carry the incision into the coloboma so that the incision in the membrane will not be limited by the iris. (a) The knife point is carried deliberately across the aqueous chamber and behind the inferior portion of the iris, and carefully brought in contact with the membrane. One can take all the time he wants in this part of the procedure, provided the fixation forceps and knife are held in absolute relaxation. The rest of the operation is done speedily so that the incision is completed before the secondary membrane begins to relax from division.

By an absolutely simple movement on the part of the surgeon the point and cutting edge of the knife blade are put thru just the sort of an excursion that is needed to produce a long clean incision in the membrane without enlargement of the surface wound in the cornea. (b) From the position in which the knife is held with the point in gentle contact with the secondary membrane the part of the knife handle between the pulps of the finger

and thumb is carried in a straight line by a free rapid movement of the arm, without any change in position of the hand or wrist. By this movement the blade is made to slip in and out of the vitreous without any interruption in the sliding motion on the membrane, and the noncutting edge of the blade receives gentle pressure against the cornea until the blade slips out of the corneal wound, usually without loss of aqueous. Figure 2 shows the mechanics of the process. As the ends of the forefinger and thumb are carried along a straight line from position "A" to position "B" the knife handle changes position as tho working freely on a pin, passing straight through the knife handle and set in the pulps of the forefinger and thumb. This imaginary pin passes straight along the course indicated by the arrowed line in Figure 2, and the knife slides, first in and then out, as it goes across the eye, and the operation is done. The insult to the eye has been almost none.

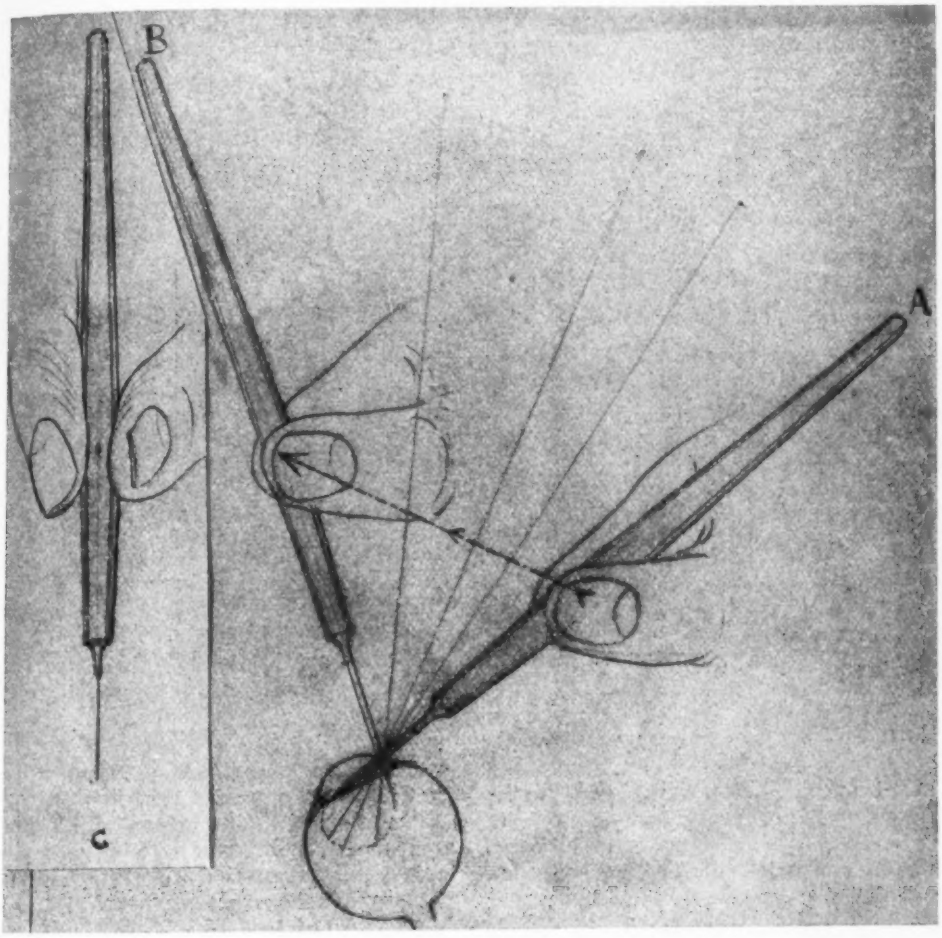

Fig. 2. Mechanics of discission. Finger and thumb hold knife lightly and are carried along arrowed line. Knife point courses in vitreous body along dotted line. C gives view of back of knife as held in fingers.

The result of this act is a straight incision, which gradually opens up and never has a tendency to close. Manifestly, the opening must be in the visual line, but the width is not important as long as it is properly placed. Figure 3 shows a typical opening by

this method. In this illustration the effect of severing a band is shown by a slight angulation in the edges of the opening where the band was cut. There is no membrane, no matter how heavy the bands, that will not open freely by this method if the knife and the technic are correct.

Iridotomy can be accomplished by the same maneuvre. The length of the incision is governed by the distance between the point of the knife and the place on the handle where the ends of the thumb and forefinger rest. The nearer to the knife point the fingers are placed, the shorter will be the incision in the iris. The scheme shown in figure 2 can be used to work out accurately the length of the membrane incision which will result from any finger position on the handle.

If the iris is drawn strongly toward the wound in an aphakic eye, an incision across the fibers, if of proper length and properly placed, will result in almost a round pupil.

Figure 4 shows a suitable eye for iridotomy, with a dotted line to indicate the incision in the iris. This eye suffered from recurrent attacks of iritis, and glaucoma had developed. Iridectomy had been performed with injury to the lens. Absorption of the lens was allowed and the condition shown in Figure 4 ensued. Figure 5 shows the opening which resulted from the single horizontal incision, made by the same technic as outlined for after cataract, only the handle of the knife was held nearer the point. By this technic the iris and underlying membrane are easily cut.

Slitlamp Corneal Microscope Observations. The examinations were made with the cooperation of T. H. Johnson, whose superior skill was relied on. I had hoped that observations under high magnification would lead us to the conclusion that my method gives less damage to the eye than other methods; in which it would seem that prolonged manipulation might cause more disturbance to the vitreous than a quick single incision with a keen cutting instrument. But comparisons of findings in cases operated on by my technic, with those operated on by different sorts of knife needles offered nothing convincing in regard to the degree of disturbance in the vitreous.

In some eyes which received my maneuvre there was what appeared to be a definite vertical cleft in the anterior vitreous structure, which presumably resulted from the single incision and the walls could be followed with the light bundle and the microscope. This opening might appear to

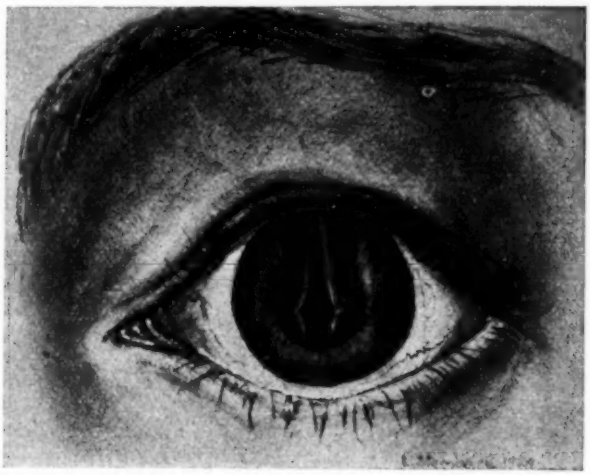

Fig. 3. Opening in secondary membrane after discission. There is slight angulation of edges where a band of membrane was cut.

be of advantage but probably it offers no appreciable difference in favor of visual acuity. Moreover, there is a possibility that in some cases we were focussing between normal vertically disposed folds. In his atlas Vogt shows, in Figure 334, what he calls "typical tunic like vertical folds;" and, in Figure 339, the step like antero-posteriorly arranged normal area of folds. But we think that we have not been confused by this striking arrangement of hanging folds, which presents itself in the anterior part of some vitreous bodies observed under high magnifications.

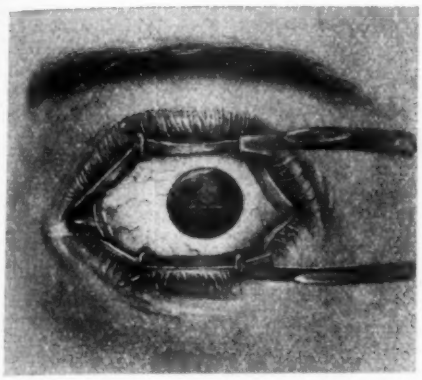

Fig. 4. Obliterated pupil in aphakic eye.

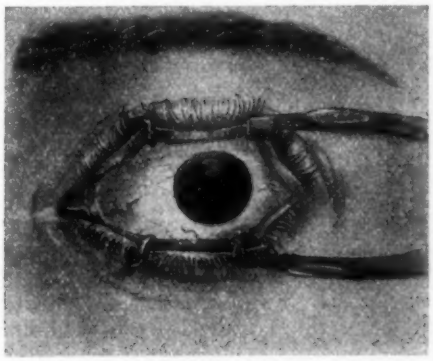

Fig. 5. Opening which resulted from slight horizontal incision thru stretched fibers or iris and underlying membranes.

After division of the membrane, vitreous enters the aqueous chamber; and the outline of the intruding vitreous and the particles of structural elements can be seen in detail. There are fibers, membranous particles, remnants of the fetal vascular system of the vitreous, greyish white spots and pigmented dots. These tremble with movements of the eye, but do not float freely in the aqueous. It is not possible by any method to cut a secondary membrane without entering the vitreous; and as the instrument is removed from the eye the viscid vitreous has a tendency to stick to the instrument and follow it out of the eye. At the wound the vitreous is stripped off the blade and usually adheres to the wound, even if none follows out with the knife so as to present. So in most cases, after division of the after cataract by any method, the vitreous can be seen slanting forward toward the wound, and in some cases the attachment to the wound can be seen. Such attachment of the vitreous to the wound has to do with development of iridocyclitis and glaucoma in a very small percentage of cases operated on, but in most cases it is not of importance. The study of the vitreous body under high magnification is new business for the oculist, and our findings may assume new meanings after better acquaintance.

LENS ANTIGEN AS A FACTOR IN CONGENITAL AND HEREDITARY EYE ANOMALIES.

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The authors have failed to produce congenital anomalies of the crystalline lens by use of lens antigen. Experiments in this direction are recorded and the reported production of lens anomalies by other modes of treatment of pregnant animals is discussed. It is suggested that serologic processes of immunization may cause such anomalies, rather than the specific lens antigen. From the Department of Anatomy, University of Nebraska College of Medicine.

While carrying on some experiments in teratology we were attracted by the work of Guyer and Smith in 1918, as suggesting in tissue specific antisera a possible tool for our purpose. After repeated unsuccessful attempts to secure specific sensitization to various tissues, except possibly in the case of the kidney, we determined to confine our work to lens antigen. Judging from the above work its action seemed to be positive and we hoped thru repetition of those experiments we might gain experience which would help us with other tissues. In the past two or three years the experiments with lens antisera have claimed the major part of our attention. We are reporting our results at this time with no intention of entering into a controversy, but with the hope that they may tend to limit broad generalization until workers in this field have succeeded in throwing some light on the processes operating to produce the hereditary eye anomalies which Guyer and Smith have secured.

In 1903 Uhlenhuth discovered that lens protein was apparently different from other body proteins, in that it possessed organ specificity rather than species specificity. This paper stimulated a large amount of experimental work on the application of protein sensitization to ophthalmology. This work was very fully compiled and analyzed by v. Szily in 1914 and, while many conflicting results were shown, it seems settled that auto- and heterosensitization to lens protein can be produced. Uhlenhuth and Haendel in 1910, and Roemer in 1905-14, attempted to show that senile cataract was the result of the action of some cell poison on the cells of the lens. The wide field covered by this work, ending in a specific organotherapy with lens protein, which has by no means been generally accepted, furnishes much data too valuable to overlook.

More recently the experiments of Guyer and Smith have attracted wide attention and suggested many problems of clinical as well as biologic interest. Their results appeared in a series of papers published in 1918-20-24; and describe the injection of fowl anti-lens serum and rabbit lens emulsion into pregnant rabbits, thereby producing abnormal eyes in the young. Breeding experiments with this abnormal progeny revealed the fact that the defects were transmissible. They concluded that the lens antigens have the power to produce serologic changes, or to create antibodies which will pass the placenta and exert a lytic influence on the developing eyes; and that "Germinal constitution can be attacked by immunologic influences," is the best hypothesis to account for the heritable eye defects, which they secured in constantly increasing numbers thru 8 generations.

Before our work was ready for publication the papers of Finlay, and Huxley and Carr-Saunders appeared. After carefully repeating Guyer's experiments, they reported their failure to secure a single rabbit, rat or mouse with eye defects. Our results are in entire accord with theirs, and we wish to reaffirm the statement made by Huxley and Carr-Saunders that "the serologic induction of hereditary modifications is not proven * * * and especially that any far-reaching speculation, based on the assumption of this influence, is at present unjustified."

All of our experiments have had for their object the determination of the influence of auto- and heterosensitization with lens protein, on the eyes of young in utero. Many of the methods used were suggested by the work of

Guyer and Smith. In the earlier portion of our work we used rat, rabbit and sheep lenses for sensitizations of fowls, and we injected the fowl antiserum into pregnant white rats and rabbits. As pointed out above, at that time we were uninterested in the serologic questions involved and only wished to produce eye anomalies. When all of these experiments proved negative, we began testing our animals by complement fixation to determine sensitization, and only such animals from our earlier experiments as repeated later tests suggested were fully sensitized, will be included in this report.

Sensitization of Fowls. During the first year that these experiments were carried on we injected fowls by the peritoneal route with rabbit lens protein, extracted in salt solution. A fowl was given 2 to 5 lenses covering a period of 8 to 10 days and bled on the tenth day after the last injection. Occasionally a fowl was made sick by the injections; and, of sixteen fowls injected, two died within three or four hours after a heavy injection. In this series no attempt was made to determine the degree of sensitization produced by the injections. In all of our later work exact calibrations were made of all of the reactions, and we wish to thank Doctor Myers of the Serology Department for furnishing us with every facility for immunologic tests, and for the helpful interest which he has shown in our work.

The complement fixation test used in all animal tests was the one standardized and used in the Health Department of the City of New York. In order to develop a high titer of sensitization, different methods were tried and a routine procedure based on these results was adopted. The approximate dosage of lens protein was as follows: the average weight of a rabbit lens in the animals we were using was slightly more than .5 gms. A total nitrogen determination showed that the protein constituted about one-third of the whole by weight. One lens to 5 cc. of salt solution was used as our standard solution, each cc. containing .1 gm. of fresh lens or .03 gm. of protein.

It will not be necessary to review the details of serologic procedures familiar to every worker in this field. We found no difference in the degree of sensitization produced by intraperitoneal and intravenous injection. Likewise the method of preparing the lens solution seemed unimportant, and desiccated lenses worked as well as fresh ones. The lens solution which was centrifuged for ten minutes, leaving only the soluble protein, worked much easier in the syringe and we think was less likely to produce shock following injection. Huxley and Carr-Saunders suggested that there might be criticism of the use of a solution which did not contain the insoluble protein. It is probably true that a certain antigen or antigens are lost by centrifuging or filtration, Kodama '22; but if so, we still have much negative data, for, in that our later work employed centrifuged antigen, our experiments complement those of Huxley. There is possibly a wide range in the dosage of protein, Kahn and McNiel '18; but it seemed to us that we obtained the best results from doses of 50, 75, 100, 125, and 150 mgms. of lens injected at 48-hour intervals and bleeding 10 days after the last injection.

Our fowls were all sensitized with rabbit lens and rabbit lens antigen was regularly used in the complement fixation tests. We tested a number of our positive sera with ox, sheep, pig, rat and fowl lens antigen and obtained positive readings. While these tests were not apropos to our other work, they furnish additional evidence of the organ specificity of lens protein. In order to secure the large number of lenses needed for our work, we collected the lenses from all of the rabbits used in animal work in the other departments, removed the lenses as sterile as possible and desicated them. This proved a simple method of preserving our antigen until such time as it was needed. We found no fowls giving a positive reaction before sensitization. Of 21 fowls treated in our last series only one died from injection, and this animal showed a strong reaction after the first and second in-

jection and died a short time after the third dose.

Treatment of rabbits and rats with antilens serum. The rats used in these experiments were secured from Doctor Jackson's colony of the University of Minnesota. In many respects these experiments were unsatisfactory. An epidemic pneumonia and middle ear trouble broke out in the colony, and the rats with which we were experimenting were more or less affected, so that it was difficult to estimate the missmatings and abortions which should be attributed to the antiserum treatment. We succeeded in saving only two litters from this series of injections; in one the mother received two 1 cc. doses of serum on the tenth and fifteenth days before the termination of pregnancy; in the other, two 1 cc. doses were given on the tenth and twelfth days before birth. From the two litters 12 young were reared and later mated. All were normal as well as the F2 generation. From the pregnancies in which there was late abortion, or term delivery of dead or killed young, we examined 9 animals from three litters. In none of these did the microscopic sections reveal anything abnormal.

Later we attempted to reach the young by active immunization, using sheep lens emulsion. Injection was begun on these rats, using ½ lens at each injection, at the time of mating and kept up at two or three day intervals till pregnancy was well advanced. Four lens treated litters, 17 animals in all, were reared. These rats all had normal eyes. Before mating time these rats were lost in the general colony but no abnormal-eyed young have since been discovered in the colony. The direct injection of sheep lens disturbed the rats very little, and since we made no tests, we cannot be positive that they were sensitized altho we feel safe in assuming that they were. Other rats injected with three 5 cc. doses of standard rabbit lens solution and bled on the eighth day gave 4 plus reaction with both rabbit and pig antigen.

Passive immunization of rabbits. The rabbits used in these experiments were secured from commercial breeders and were all "pure blood" or pedigreed stock, none had been bred more than once and all were healthy and well grown. Of the twenty does treated, two were albinos, two New Zealand reds and the remainder equally divided between the Dutch and Belgian strains. The bucks were registered Dutch stock and were untreated except buck marked "X," who was kept sensitized thru two months of the experiments when he died from some unknown cause. In the majority of cases intraperitoneal injection was practiced and the quantity of serum per dose was 5 cc. Chart I gives the details of these experiments. There was no loss of weight or inconvenience suffered by the injections except in the does B, E and H. We found the rabbits much more satisfactory than the rats for these experiments. Fertility did not seem to be unfavorably influenced and abortions were no more frequent than in controls. No disturbance of the eyes was observed in any of the rabbits receiving the antilens serum.

The majority of injections of fowl antilens serum were begun about the tenth day of pregnancy and continued long enough to insure sensitization up to the time of delivery. All handling of the does, giving injections, etc., was carried out in a way to give the least possible shock. A total of 20 cubic centimeters of serum was not exceeded in any sensitization.

Results. Full details of the breeding experiments may be found in Chart I. A total of 71 young were obtained for examination from the injected mothers. All of the embryos from abortions and those animals born dead or dying before the eye opened were fixed and the eye sectioned for microscopic study. All of the young which lived were repeatedly examined by us, and in doubtful cases also by Doctor Sanford Gifford of the Ophthalmology Department. We agree with Huxley and Carr-Saunders, that albino eyes are no easier to examine than the pigmented ones.

In several instances there were detectable differences in the size of the

CHART I.

Injection of pregnant rabbits with fowl antilens serum

Doe	Mating	Injection Date	Serum Dose	No. Young	Remarks
B	12/16	12/29–31–2	5/15	Aborted 7	Sick after each dose.
E	12/12	1/3–5–7	5/15	5	All died 1/10
F	12/22	1/3–5–7	5/15	None	
C	1/1	1/9–11–14–19	5/20	Aborted 6	
D	1/9	1/16–18–21–24	5/20	6	1 small, eyes opened late
E	1/14	1/14–18–21–24	5/20	9	All died
H	1/30	2/11–13	6/12		Died 3 hrs. after injection
B	1/14	2/2–4–6	5/15	5, one dead	
K	2/6	2/11–13–15–18	5/20	8	
L	2/10	2/11–13–15–18	5/20	7	Did not grow well
E	2/15	2/22–26	5/10	Aborted 4	Sick after injections
F	2/15	2/20–24–27	5/15	8	1 small, eyes opened late
C	2/23	2/18–22–24–26	5/20	6	All died

CHART II.

Injection of pregnant rabbits with rabbit lens solution

Doe	Mating	Injection Date	Serum Dose	No. Young	Remarks
S	10/26	11/5–7–9	5/15	4	
S2	11/3	11/5–7–9	5/15	5	
I	12/21	1/9–11–14–17	5/20	6, one dead	
M	1/8	1/9–11–14–17	5/20	6	
H	1/1	1/1–11–14–17	5/20	None	
I	2/4	2/11–13–15	5/18	8	Three died early

two eyes; this was particularly noticeable in one of a litter of F. In two instances, one each in litters belonging to D and F, there was a delay of two or three days in opening the eyes. We have observed the same conditions in nontreated rabbits so cannot attribute them to the serum injected. In one series of microscopic sections, from first litter of C, we found the eyes presenting a characteristic histologic picture which Doctor Mall has called "disassociation." The condition is frequently encountered in human abortions and was reported by one of us in 1918, in chicks treated with cold during incubation; we are consequently disinclined to interpret the condition as a resultant of a specific action of antilens serum.

The results of the injections of tested antilens serum into pregnant rabbits are negative as far as any observable specific action on the eyes of the mothers or their young is concerned. The possibility that there is a specific action on the germplasm which is recessive is being tested, but all of the progeny so far examined are entirely normal.

Active immunization of rabbits. A small series of pregnant rabbits were injected with our standard rabbit lens solution. In each case a total of 20 cc. of solution was administered and complement fixation tests showed that a high titer of sensitization was produced a few days before delivery. Precipitin test and also skin reaction test was employed as control in this series. None of the does were made sick by the injection. One, H, may have aborted early; she was later sensitized with antiserum and died from the injections. I lost all of her first litter at birth, but from our experience with first litters it is not reasonable to attribute this to sensitization. One rabbit of this litter had one eye noticeably smaller than the other, but microscopic sections showed no abnormality. Twenty rabbits were reared from this group, all had normal eyes and no eye defects were observed in the F2 generation.

Huxley and Carr-Saunders seem to have had difficulty in establishing proof of sensitization in rabbits treated with lens emulsion. They used the precipitin test to measure the antibody titer. Our experience with the precipitin test was somewhat similar, but taking this series of rabbits together with a larger group, which for another reason was receiving rabbit lens

antigen, there is no question in our minds that rabbits can be sensitized to rabbit lens. A total of three lenses seems to produce as high a titer as seven or eight and the soluble protein alone is apparently as efficient as the whole lens. These conclusions are based on the complement fixation test.

Controls. The controls were injected with extracts of various tissues, with normal fowl serum and with salt solution. It is not worth while to take space for a discussion of these as a group, for we encountered no features of interest except in one instance which will be described. This doe was borrowed from the Serology Department and there is no record of where she came from. She was a well developed young animal with brindle marking except one side of face and shoulder which were white. She had received no treatment of any sort since coming into the department. We mated her to a Belgian buck and every three days after the tenth day of pregnancy gave her 5 cc. of salt solution intraperitoneally. On Jan. 20 she had a litter of four which grew well but were unable to open their eyes. Doctor Gifford was called and cut thru where the lids should normally separate. The conjunctival sac was filled with sterile cell debris. The corneas were atrophic and opaque in spots and the lenses were opaque and of a crystalline whiteness. In a few days the lids became normal and in two animals the corneas cleared up entirely, but in all the cataractous lenses persisted. A short time after they were separated from the mother all contracted snuffles and died.

The doe was then mated with buck X2 and was untreated during the pregnancy. On Apr. 19 she had a litter of five, of which two died during the first 24 hours. Of the remaining three one died during the next day, its eyes were apparently normal. The eyes of the last two young had to be opened and both had bilateral cataract; they died before a month old. The doe was again bred but contracted middle ear trouble and died of a brain abscess.

We should perhaps report in this connection the results of observations while collecting rabbit lenses for the various sensitization experiments. In this work we noticed that occasionally the eyes of an animal showed a marked difference in size; these were laid aside and a comparative weight of the lenses was secured. In all of these cases the lenses differed in weight to a degree illustrated by the following examples from our records; R. eye .52 gms., L. eye .44 gms.; R. eye .49 gms., L. eye .43 gms.; R. eye .435 gms., L. eye .551 gms. All such eyes were otherwise normal, except in two instances which we wish to give in detail.

From the Serology department we received a dead half grown rabbit with mouse-colored coat. It was normal except the eyes, which noticeably differed in size; the right weighed 1.39 gms. and the left 2.32 gms., the right eye also had a wide coloboma of the iris. Later, from the same department, we secured a rabbit with Belgian markings; which, in the right eye, had a coloboma extending about two-thirds of the way thru the iris. The eyes were of the same size. It was impossible to discover the source of these rabbits, as the man who furnishes experimental animals to the College covers rather a wide territory in collecting from breeders. None of these rabbits with eye defects, judging by the coats, were "pure blooded" and none were albinos. The anomalies consist of microphthalmia, corneal opacity, coloboma and cataract. We do not know whether or not these anomalies are heritable and we cannot surmise their cause; but we know that none of the mothers received antilens serum, and that the doe which furnished us the two abnormal-eyed litters gave a negative reaction to the complement fixation test. The fortuitous concurrence which placed this doe among our controls, instead of in the group receiving active lens treatment, denies us the opportunity of reporting a positive result attributable to lens antigen.

Tuberculosis in eyes of rats. In 1880 Samelsohn reported congenital eye defects in puppies, whose parents had had the eyes inoculated with tuberculosis. It seemed to us desirable to repeat these experiments on a larger scale, and to test the parents with a complement fixation reaction for possible autosensitization to lens. In the light of Guyer's work it appeared logical to attribute such eye anomalies to a lens sensitization rather

than to specific action of some tuberculous toxin.

In early October, 1923, we injected a pure culture of human tuberculosis into the anterior chamber of one eye each of five female and four male white rats. In two weeks only two showed any reaction, so we repeated the injection in both eyes of all of this group and at the same time similarly treated six pairs of white rats with bovine T. B. Due to improved technic a splendid reaction was obtained in all but one male. Six weeks later a complement fixation test was positive for about half of the series, with both rat and rabbit lens antigen. We had much trouble with this test for rat blood until we inactivated for a full hour at 56 degrees.

The breeding experiments with this series of T. B. rats were somewhat more satisfactory than the experiments with antilens serum and lens emulsion. During the first six months five rats of the group died of generalized tuberculosis. Twelve litters were born, three of these were killed by the mothers and individuals were lost from each of the other litters, possibly due to the inability of the blind parents to properly care for them. Out of this group we obtained 48 first generation for examination. Careful examination failed to reveal a single eye defect and in their progeny no eye anomalies of any sort have so far appeared.

We appreciate that not all of the rats inoculated and showing an active inflammation in the eyes showed autosensitization to lens, but five of the litters reported above came from mothers giving a positive reading of the complement fixation test. Examination of the eyes of some of the inoculated rats which died showed that the lenses had been nearly absorbed by the inflammatory process. This would explain the positive sensitization reaction.

As noted above Samelsohn mated a dog which had had the left bulb enucleated, to a bitch with tuberculous iritis. Three young were born, one was normal and two had microphthalmus. He attributed the defect to a disease of the restiform body, which influenced the developing eyes. This conclusion was not based on a demonstrated lesion of the brain but was an inference based on Brown-Sequard's work. About the same time Deutschmann '80, made a similar experiment reporting on a family of eight dogs. The father was infected with tuberculosis in the anterior chamber of one eye and the mother's cornea was split and kept open till a cataract formed. The litter of six puppies consisted of four normal and two abnormal ones. One of the latter had phthisical bulb and adherent lids, while the other had chorioretinitis in both eyes. A second mating of the same parents furnished a litter of four; one died early, one was normal, one had one blue and one brown eye and one had a bilateral coloboma. No attempt was made to explain the cause of the conditions.

Mulder 1897, reported negative results in a series of 200 dogs, the progeny of parents in which the eyes had been mutilated. In addition to these experiments he infected the eyes of a pair of healthy dogs with tuberculosis, then secured from them a litter of three puppies with posterior lenticonus. He did not discuss the possible etiology but referred to a paper by Hess 1896, in which the same condition was reported for a dog and a pig.

In none of these experiments did it occur to the author to suggest that the absorption of the lens protein might produce an autolytic action on the developing eyes, but all seemed to think that the mutilation of the eyes by the tuberculous process might operate to produce developmental defects. In the light of all of the more recent work of experimenters, it seems proven that no influence is exerted on the young by the simple locus of the infection. Also there would seem to be sufficient negative evidence to warrant the abandonment of the idea that the removal or mutilation of a maternal organ may influence the germ plasm determiners for that organ.

The work of Nattan-Larrier and Monthus 1902, suggests the possibility that tuberculosis produces some toxin or antitoxin, which passes the placenta and causes a developmental arrest or degeneration of the eyes of the embryo. These workers infected 18 female guinea pigs, not in the eyes, with tuberculosis during the last fourth

of the period of gestation. Fifty young were recovered of which 18, three in each of six litters, had congenital cataract. A similar result in lesser numbers, six, was secured with streptococcic infection. Since they got no such results from B. typhosus and B. diphtheriae it would seem that some product peculiar to the first two germs acted directly on the eyes of the young.

In the experiments of Samelsohn, Deutschmann and Mulder the number of examples is too small to eliminate the possibility of coincidence, since eye defects have been observed many times in mammals; see as examples Vüller 1894, Boch 1895, Hess 1896 and Coats 1914. If we accept the explanation of Nattan-Larrier for all of these cases, viz., that "The alterations of the lens are the result of the action of toxins of the mother, on the organs of the fetuses," these experiments as well as our own with tuberculosis have no place in a paper considering primarily the factor of lens antibodies. It is difficult to explain our negative results from the standpoint of this explanation since we succeeded in establishing a very active tuberculous lesion in all the parents, and were able to examine a series of young as large as that of Nattan-Larrier. It is of course possible that dogs and guinea pigs possess a placenta more permeable to substances toxic to the growing eyes than does the rat. Or perhaps the rat may have a less easily disturbed growth mechanism for the eye. The fact that a large number of tuberculous women have given birth to normal-eyed children adds interest to the experiments of Nattan-Larrier to say the least.

The work of Brown-Sequard, in which he seemed to effect changes in the germ plasm, so that he secured eye defects running thru eight generations is still unsubstantiated. It is difficult to see any relation between section of the restiform body and such results. It would seem that this citation belongs in the same class with the case of a game cock reported by Cope; in which the cock had one eye injured in battle and all of his subsequent progeny showed eye defects; and with the case of Tobias, in which a young woman had a double iridectomy, and later gave birth to two children with coloboma. Such untoward results of mutilating procedures are entirely negatived by the thousands of surgical operations, which, as far as can be understood, should have equally disturbing effects on the eyes, or the eye determiners of the germ plasm, but which have had no influence whatever on the after-coming young.

The possibility of auto- and hetero-sensitization to lens protein, and to uveal tissue as well, Woods 1918, and Roemer and Gebb 1914, seems to be settled in the affirmative. There is little doubt that the products of lens sensitization will pass thru the placenta. It is entirely possible that autosensitization may be a concomitant of ophthalmic inflammation, especially if lens absorbtion is a part of the process. This has been shown by our experiments with tuberculosis. Experiments like those cited above, or the case of Perlia 1887, in which a mother developing keratitis in the first month of pregnancy, gave birth to a child with coloboma on one side, and microphthalmia on the other, make the theory that lens antibodies are the causative factor in eye defects a very attractive one. Our negative results relieve us of the necessity of employing such an explanation; and we feel that such experiments must be repeated in a large series with careful serologic checks at every step before apparently positive results can be used to support such an interpretation.

Discussion. The group of experiments which we have carried on had for their purpose the passive, active and autosensitization of pregnant rabbits and rats to lens protein, in order to determine the effects on the eyes of the embryos. Our results have all been entirely negative. We fully appreciate the value of negative evidence and have earnestly sought to discover the faults in our technic which gives us results so radically different from those of Samelsohn, Guyer and Smith and others. When, however, we compare our results with those of Finlay and Huxley and Carr-Saunders we incline to the belief that the true explanation for the eye anomalies reported by the former workers does not

rest upon a lytic action of lens antibodies.

All the more recent investigators agree with Uhlenhuth that the lens protein is organ specific and species nonspecific. It has also been established that dogs, rabbits, rats, guinea pigs and fowls can be sensitized to lens. In all of these experiments the eyes of the animal sensitized have remained free from any observable effects. The assumption that "Due to a fuller circulation," (Guyer 1918) the embryonal eyes are attacked by the lens antibodies begs the question and dismisses certain serologic problems which should receive attention.

It is reasonable to assume that the placental barrier can be passed by antibodies or antigens, and that the embryo may carry them, or other products engendered by them, in its circulation. The evidence on the subject is somewhat contradictory and it is entirely possible that some antibodies will pass and others will not, due to the size of the molecule, Shimidzu '22. The number of positive results obtained from the examination of animals at birth leads one to believe that some antibodies normally pass thru the placenta, rather than that a placental lesion was present in each case. The wide range of such results is illustrated by the following: Chauveaux, anthrax in sheep; Ehrlich, toxalbumins in mice; Mossé and Daunic, typhoid in humans; also Widal and Sicard, typhoid in rabbits; Bullock, Bertino, Guyer, hemolysins in rabbits; Sherman, opsonins in pigs.

Guyer and Smith demonstrated that lens antibodies were present in fetal rabbits whose mother had been sensitized to lens protein. In none of those experiments is there any evidence that the antibodies or antigens disturbed development either generally or specifically, except possibly in the lens sensitization experiments reported by Guyer and Smith. In the light of the negative results of Finlay, Huxley and Carr-Saunders, and of our own experiments, it would appear that there is hardly justification for the assumption that lens antibodies, which produce no observable effects on the eyes of the animal sensitized, enter the fetus, not only to exert a lytic influence on its well developed eyes, but on the eye determiners of the germ plasm as well.

The serologic processes involved, especially in the case of passive immunization, are apparently very complex. Bordet showed that repeated inoculations of an animal with a foreign immune serum produced an antisensitizer or anti-antibody, and that such anti-antibodies are not identical with those which anchor the amboceptors, but neutralize various unspecific as well as normal anti-antibodies, in the serum of the same animal. Until the various serologic processes involved in these lens sensitization experiments are better understood, the presentation of any hypothesis accounting for lens changes in the embryo is unprofitable.

Congenital eye defects have been produced by many different procedures, Stockard and Poynter to quote two examples; but we are unaware of any work in experimental teratology which suggests the causative factor in either the congenital eye anomalies reported in the experiments of Nattan-Larrier, Brown-Sequard and Guyer and Smith, or in the heritable character of these defects as exhibited in the work of the latter two investigators.

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A TEST CHART SCREEN AND A FAMILIAR TEST CHART WITH LETTERS REORIENTED.

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This screen consists of a frame carrying black shutters which can be slid to cover any desired portions of the chart leaving exposed only such test letters as it is desired to use.

The Test Chart Screen shown in the accompanying illustration (Figure 1) has a wooden framework, consisting of two, parallel, vertical and two, parallel,

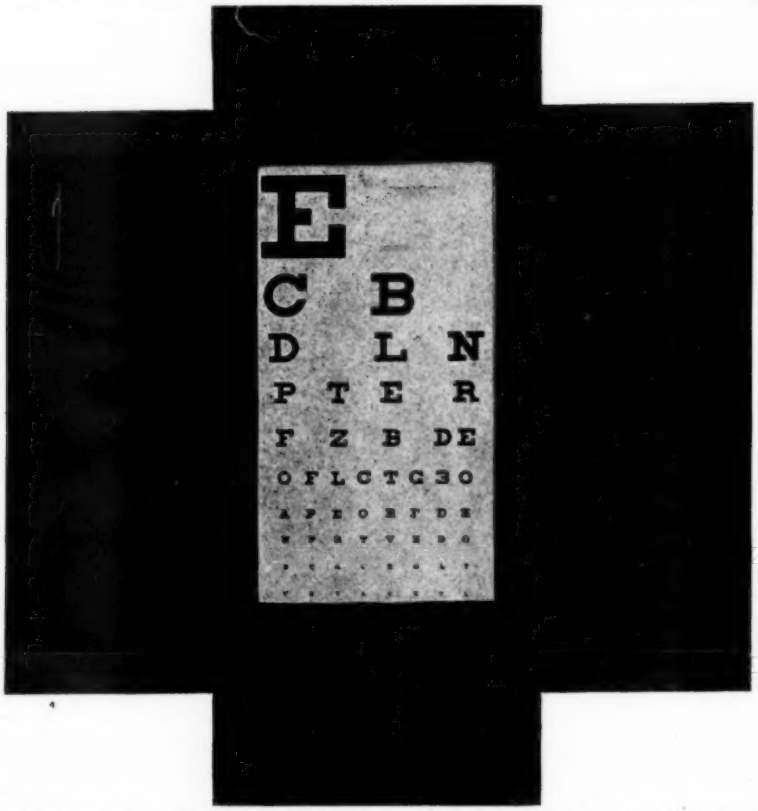

Fig. 1. A light wooden framework supports a central stationary Test Chart and four black panels movable in grooves toward and away from each other.

horizontal pieces suitably intercrossed. Each of the four cross-pieces is grooved to form with its fellow on the opposite side a vertical and a horizontal pair of grooves, which support four movable black panels. The Test Chart occupies a stationary central position. The four black panels are positioned one at each of its four sides. The black panels may be adjusted to different positions toward and away from each other within the grooves, in which they slide, so that any selected number or group of characters on the test chart, in horizontal or vertical lines, may be disclosed to view, all other characters being at such times concealed. The black panels form a rectangular aperture of any desired size, over any portion of the Test Chart. The panels are located in two planes, adjacent to each other, and very close to the front face of the chart in order that when the chart is illuminated no shadow from the edges of the panels shall be thrown upon the Test Chart. Each two opposite panels move in the same groove and the arrangement is such that one panel cannot possibly interfere with the adjustment of any other panel.

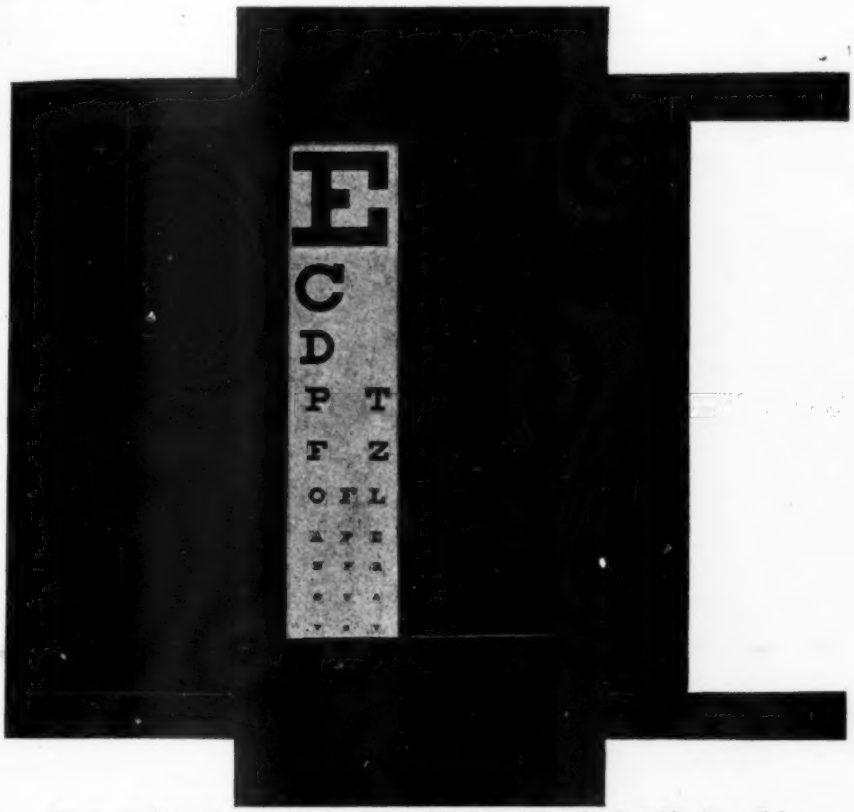

Fig. 2. Position of panels favored for quickly determining visual acuities in a clinic.

Means have been provided for retaining each panel yieldingly in any position to which it may be adjusted. There is a latch at the distal end of each groove which may be turned to permit the withdrawal or insertion of a panel.

The Chart is the familiar Snellen Test Chart with the letters rearranged in vertical as well as horizonal lines. Some of the advantages of this chart and screen will be enumerated:

I. The aspect of the chart is agreeable to the eye. (The 4 minute letters of the test chart of Dr. J. Monroe Thorington also are arranged in vertical as well as horizontal lines to en-

able patients to fix a letter just below when directed to do so. This chart may be used advantageously in my screen.)

II. In taking the vision, the patient may be asked to name only the first letters of each line, from above downward. Thus in a moment's time the patient's limit is reached. The saving in time and annoyance will be appreciated by those having to take the vision of clinic patients. With the Test Chart Screen, other letters may be temporarily concealed, as in Figure 2.

III. A refraction may be continued with only a single line of letters visable, as in Figure 3.

IV. Useful small sections only need be disclosed to view, as in Figure 4.

V. There is no harm in the patient's becoming familiar with the letters during a refraction, if his interest is aroused, mainly to secure clear definition. If, however, this familiarity is found objectionable, a different and unfamiliar portion of the Test Chart may be exposed.

VI. Applicants visually ineligible for Air, Army, Navy, Railroad or Pilot service cannot deceive examiners thru having memorized the letter sequences. Only one, or only two letters, from any portion of the chart, need be disclosed to view at one time. These may be selected at will by the examiner without recourse to other than the familiar and standard Snellen Test Chart and changed almost without the applicant's knowledge.

VII. By drawing the upper panel down, the examiner is saved the time and annoyance of hearing the large letters repeated by patients who can readily see the smaller types, and a line of letters is more readily fixed upon when it is overlined and when the

Fig. 3. Fixation may be restricted at will to a single line, concealing all the rest.

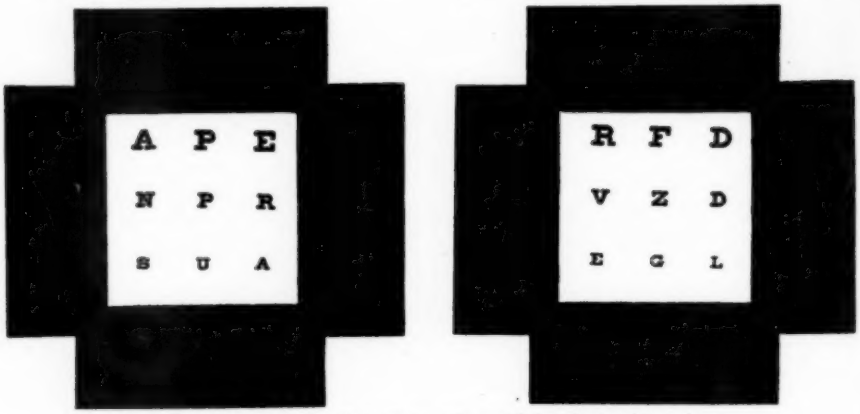

Fig. 4. Useful small sections only need be disclosed to view.

larger letters which would tend only to distract attention, are concealed.

VIII. By raising the lower panel, the line being read by the patient is also distinctly underlined, helping fixation. Small letters beyond or not yet brought within the patient's range, are kept concealed. As the correction becomes more perfect, an additional line may be shown, thus advancing the patient to full acuity or beyond. Even patients with full visual acuity are apt to be better satisfied if the small letters far beyond their visual acuity are not disclosed to view.

IX. Nervous or aged patients, whose visual acuity is low, become alarmed if numerous small letters on the chart are indistinguishable to them. Also in these cases, the smaller letters are kept concealed by raising the lower panel sufficiently.

The refinements of refraction just begin, after the patient is able to see the line normal for the distance at which the refraction is carried on. With the aid of this screening device and the new, but familiar card, these refinements are more effectively carried out.

Fig. 5. Position favored in cases with low visual acuity, small letters kept concealed.

ARE THE CURRENT THEORIES OF ACCOMMODATION CORRECT?

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This is an inquiry based on the study of 2,000 cases of homatropin cycloplegia. The generally accepted theory of Helmholtz is stated with its obvious implications that at the period of presbyopia there should be a surplus of power in the ciliary muscle that would make it easy to relax the zonule to the extent necessary; and second, that with the maximum accommodation fixed in this way it would be impossible to increase the amount. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, August 1, 1924.

The Helmholtz theory of the mechanism of accommodation would seem to be firmly established by experimental evidence, and the deductions that almost necessarily flow from it have been accepted generally and without much question. It is the aim of the present article to emphasize certain clinical facts which invalidate these deductions; and which would make it appear that the ordinary interpretation of the Helmholtz theory requires some reshaping in order to make it fit actual conditions.

What in brief is the hypothesis and what are the deductions drawn from it? It is said that the ciliary muscle by its contraction relaxes the suspensory ligament of the lens and thus allows the lens itself to expand by means of its own elasticity. The amount of this expansion which, of course, effects the accommodation of the eye, is thus conditioned on two things—the contractile power of the ciliary muscle and the elasticity of the lens. The latter, we know, diminishes steadily thru life, and for that reason the accommodation diminishes year by year. But the contractile power of the ciliary muscle, it is believed, remains practically constant. In other words, if the elasticity of the lens remained unchanged, it is held that the man of thirty and forty would have the same accommodation as the boy of ten.

Furthermore, the theory implies that, tho as age advances an increasing sclerosis of the lens prevents the latter from expanding, it does not add any obstacle to the contraction of the ciliary muscle, since the suspensory ligament of the sclerosed lens is as free to relax as is that of the fluid lens of a child. In order to understand what this idea involves, let us consider how the accommodation is measured, and what these measurements reveal in persons of different ages.

The maximum accommodative power which anyone can put forth is best determined by ascertaining how close an object sufficiently minute and well defined can be brought to the eye and still be seen distinctly. Of the minutiae of this investigation and of the precautions that must be used, I need not speak here. They have been elsewhere[1] sufficiently set forth. It suffices to say that the accommodation as thus measured is best represented in dioptries. Thus a person either emmetropic or made emmetropic by glasses, who by his utmost effort can focus to a point 20 cm. from the eye, has an accommodation of 5 D, one who can focus to 6 cm. has an accommodation of 17 D., etc. The advantage of this representation is that it is probably a fair—certainly the best—indication of the amount of effort put forth. We may thus use measurement in dioptries to indicate, on the one hand, the refractive change produced in the crystalline lens by expansion, and, on the other hand, the units of energy expended by the ciliary muscle. For dioptry used in the latter sense the convenient term myodioptry has been proposed. The number of myodioptries thus denotes what Fuchs calls the physiologic accommodation, measuring the contractility of the ciliary muscle, while the number of dioptries that we find by determining the near point denotes the physical accommodation and measures the expansibility of the lens. According to theory, then, the physical accommodation shown by the number of dioptries of manifest accommodation continually diminishes, but the number of myodioptries denoting the physiologic accommodation or amount of ciliary energy remains the same. This means that as age

increases a larger and larger number of units of ciliary energy becomes latent and useless.

Let us see what this theory implies.

1. In the first place, it would mean that in persons of twenty-five and over, or certainly in those of thirty or over, there should be no fluctuation in accommodative power. To show this let us consider three subjects aged respectively ten, thirty-two and forty-five. Each by hypothesis has at his disposal at least 18 and perhaps 20 D. of ciliary energy (18-20 myodioptries). The boy of ten, when urged to the utmost effort, is able to use 16 or 17 of these 18 D. and has, therefore, but 2 or 3 D. latent. The man of thirty-two can at his utmost exert 9 D, of accommodation and so has at least 9 D. latent; and the man of forty-five can exert only 3 or 4 D. and thus has some 15 D. latent. The boy, then, when using 16 D. of accommodation is working near the limit of his muscular power, and it can readily be understood that at times he might not be able to do nearly as well as this. And in fact the variations shown by these young subjects are at times considerable, amounting to 6 or 7 D. As a rule, however, they are much less, only 2 or 3 D. at most. Indeed, the tests made in children of from nine to twelve are often surprisingly constant. In the child of nine to twelve, the manifest accommodation even when at the lowest limit of its variation practically never falls below 9 D. and very rarely indeed below 10 D. This amount of ciliary energy, then, he can exert at all times. We should expect the same to be true of the adult if he had the same amount of ciliary energy to draw on as the child. Hence, if the man of thirty-two really has 18 D. of ciliary energy, but owing to the diminished elasticity of his lens can use only 9 D. of this, he ought to have no difficulty in reaching this limit at all times since it represents only 50 per cent of his total energy. Of course, this argument is still more convincing if we suppose the total ciliary energy to be more than 18 D. There is no more reason why his accommodation should ever fall below the 9 D. which his rigid lens permits him to use than there is for the boy to do likewise, since both have the same total to draw upon. This is still more the case with the man of forty-five. The 3 or 4 D. of ciliary energy which the latter is able to exert is such a small proportion of his assumed total of 18 or 20 D., that it seems inconceivable that he should not at all times be able to put it into play. In neither the man of thirty-two nor the man of forty-five should there ever be an inability to accommodate to their manifest maximum.

But, as a matter of fact, such inability is often seen; and we find that the accommodative power in these middle-aged subjects fluctuates rather considerably from time to time. Thus in a man of thirty-two whom I tested, the accommodation varied from 7.8 D. to 9.75 D., in another from 6.7 D. to 8 D., etc. In fact, at this age variations of a dioptry or more are not infrequent. At forty-five the variations are naturally much smaller, but they do occur and sometimes amount to nearly a dioptry and even more. Thus in one woman of forty-five the accommodation in the course of three months ranged from 2.25 D. to 3.6 D. It seems inconceivable, that if this woman had 18 D. of energy to draw on, she could not at all times have exerted without any trouble at all the full 3.6 D. that her rigid lens permitted her to use.

2. If there is so much accommodation in reserve, then it seems inconceivable that a subject who when tested in one way showed a given maximum should be able to increase that maximum by any artifice.

But this can be done. For example, a subject, whose maximum power tested by repeated trials, if either eye alone was used, was 2.5 D., showed when tested with both eyes together, an accommodation of 3.6 D. This extra dioptry of accommodation was evidently secured by an overplus of ciliary effort, not exerted under ordinary conditions, but put forth under the in-

fluence of convergence.* This increase of accommodative power as a result of convergence in binocular vision occurs quite regularly in subjects of all ages. The inference would seem to be that in a case like this the total accommodative energy which the state of the lens would permit to be put into use was 3.6 D., but that under ordinary conditions even this small amount could not be exerted even when the patient was making an extreme effort. This inability seems inexplicable, if there is really a total of 18 D. to draw upon.

3. The most convincing evidence, however, is afforded by the study of the effect of cycloplegics, especially homatropin. Here we have a drug which produces a gradual paresis of the ciliary muscle—a paresis which takes usually an hour or more to become complete. Suppose now that we have four subjects, aged respectively ten, twenty, thirty, and forty, into whose eyes we instill homatropin. The first of these subjects has perhaps a manifest accommodation of 16 D., the second 11 D., the third 8 D., and the last 5 D. In all four cases, according to hypothesis, there are at least 18 D. of ciliary energy (18 myodioptries). In the first case, then, there are some 2 D. of accommodation latent, in the second 7 D., in the third 10 D. or over, in the fourth not less than 13 D. In the first, then, the drug should act quickly since its effects would become manifest as soon as it had abolished 2 D. of the total accommodation. In the second case, the effect should take longer to become apparent, since the drug has first to abolish 7 D. of ciliary accommodation. Still more latent slowly should the drug act in Case 3, the man of thirty, and slowest of all in Case 4, the man of forty.

Now as a matter of fact the drug acts as a rule more quickly in the man of thirty than it does in the boy of ten or the youth of twenty; and in the man of forty it acts more quickly than in any one of the three younger subjects. The validity of this statement is attested to by the following table which is based on the examination of over two thousand cases in which the progress

*It may be argued that the increase of accommodation in binocular vision is apparent only, being due to the sharper definition produced by the contraction of the pupils that the convergence causes. But in this case, as in numerous others studied, the convergence was so moderate that there was no sensible contraction of the pupils.

TABLE I.

Age	Percentage of Cases in Which Accommodation Began to Recede in Number of Minutes Indicated Below					Cases Used to Determine Percentages	Total Cases
	10 M.	12 M.	14 M.	15 M.	16 M.		
7–10	17	35	63	80	86	29–38	53
11–15	21	35	60	68	77	97–110	149
16–20	11	32	56	71	77	183–152	206
21–25	19	43	67	77	82	155–191	238
26–30	26	48	73	80	87	174–208	274
31–35	32	57	77	83	87	171–216	301
36–40	38	62	79	83	90	167–213	276
41–45	46	70	84	89	91	220–286	325
46–50	43	64	80	84	89	134–158	191
Total							2013

NOTE.—The variations in numbers in this column as well as the discrepancies between them and the corresponding numbers given in the column marked "total cases" is due to the fact that for each time limit noted there are a certain number of cases in which it could not be determined whether the accommodation had then begun to recede or not.

of the cycloplegia and mydriasis produced by homatropin was carefully checked.

From this table it will be seen that in persons of 41 to 45 inclusive, 45 per cent show the effects of homatropin in 10 minutes, while of those from 11 to 15 inclusive but 21 per cent are then affected. In fact, as the table indicates, persons of 41 to 45 are affected about two minutes earlier than those of half that age and perhaps three minutes earlier than persons of 16 to 20.

All the facts above mentioned seem quite inexplicable on the theory that the ciliary muscle maintains its power substantially unchanged through youth and middle age. But they are easily explicable if we suppose that the ciliary energy dimishes with age almost in proportion as the manifest accommodation diminishes. If, for example, a man of forty with a manifest accommodation of 6 D. has a total ciliary energy of 8 D. and not of 18 D., then it is readily seen why his manifest accommodation may fluctuate a dioptry or so; and also why under the influence of homatropin, it shows a reduction at least as early as in the case of a younger subject with a much higher accommodation.

The same conclusion is borne out by a study of the curves representing the fall of the accommodation produced by homatropin at different ages. Thus, out of 220 patients between 41 and 45 years of age we find that in 154 the accommodation had already begun to recede in 12 minutes. By this time, as the curves and the tabular records show, it had fallen to an amount varying generally from 2 to 4 D. This amount represented the whole of their ciliary energy then remaining. For the fact that they were now persistently below their starting point, which represented the limit set by their sclerosed lenses and that they could not by any effort attain this limit again shows beyond doubt that all their latent accommodation and some of their manifest accommodation, too, had been abolished. Accordingly, if we suppose these subjects really had 18 D. of ciliary energy to start with, they must have lost from 14 to 16 D. in 12 minutes. Now the curves show that the amount a young subject loses in 12 minutes is at its greatest 9.5 D., but usually does not exceed 6 D. and not often 4 D. It seems inconceivable that an older subject should regularly lose an amount so much greater in the same time.

It seems inconceivable, too, that the amount of accommodation abolished in a given time by the action of homatropin should regularly increase with age. But this is what it does do, if the theory is correct. Thus in four subjects, aged respectively eleven, twenty, thirty-one and forty, the curves showed that if the original ciliary energy was assumed to be 18 D., then in the first case the reduction produced in 14 minutes was 28 per cent, in the second 41 per cent, in the third 60 per cent, and in the fourth 82 per cent. Such an excessive difference seems quite unlikely. Much more probable is it that the rate of fall in accommodation due to the homatropin is more nearly equal in the four cases. In this event the original supply of ciliary energy, which is probably some 20 D. or more in the first case, must be distinctly lower in the second, lower still in the third, and lowest of all in the fourth.

Different curves indicate by their form that the rate of recession under homatropin may differ considerably in different cases. Again, many of the variations are such as to make us believe that the original stock of ciliary energy may differ a good deal in persons of the same age. But all the curves examined lead to the same inference, i. e., that as age advances the total of ciliary energy diminishes, and that in middle age there is a very small stock to draw on. Thus in Fig. 1 the curve *A* which represents the recession in one of my patients, aged forty-five, shows that the accommodation, 2.4 D. to start with, had already begun to fall in 7 minutes. One cannot believe that in such a space of time it could have undergone a drop of 15.5 D. or of 86 per cent, as the hypothesis would demand. Rather it seems likely that the real stock of ciliary energy originally present was

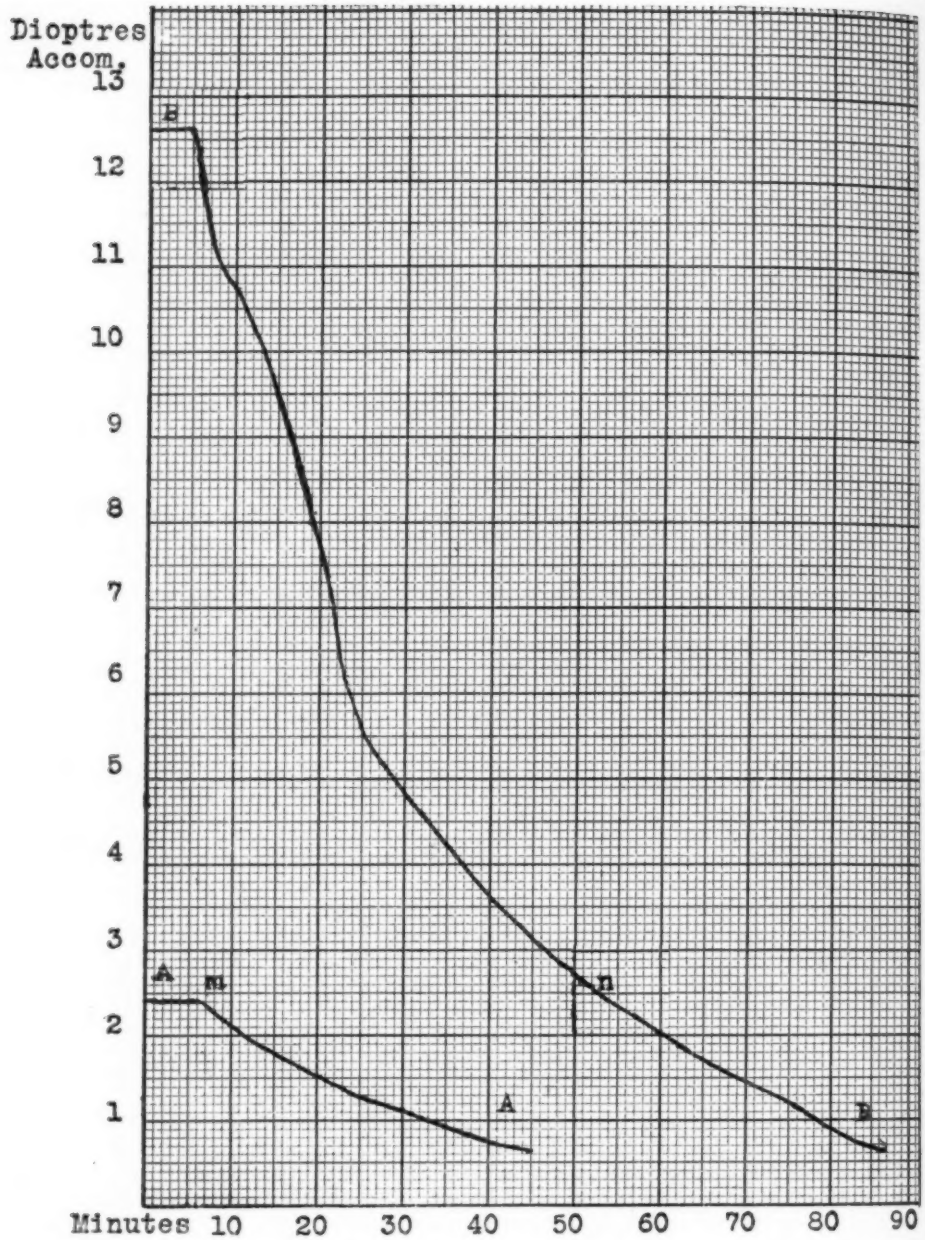

Fig. 1. *A, A,* curve representing the recession of the accommodation under homatropin in a man of 45. *B, B,* similar curve in a girl of 12. If the original accommodation in each case is supposed to be 18 D. then the fall in 6 minutes in the first case would be 15.6 D or 78 per cent, while the fall in the second would be 6 D or 33 per cent. But if the original accommodation in Case *A* is supposed to be 3 D and in case B 15 D, then each curve really would be quite alike, representing a fall in a geometric ratio of 20 per cent each 6 minutes—i. e. at the end of each six-minute period the residual accommodation would be 80 per cent of what it was at the beginning of the period. This more plausible assumption seems borne out by the following fact. Curve *A* from *m* onward is almost precisely like Curve *B* from *n* onward. We may reasonably infer that the small portion of Curve *A* before *m* (representing in this case the diminution in the latent accommodation) and the small portion of Curve B before n are also alike. In this case the starting point of Curve *A* would be something less than 3 D.

not over 4 D., probably a little less. Then the drop in successive periods of time would correspond quite closely to those shown in curve *B*, taken from a twelve-year-old girl.

Thus, if we suppose the latter to have had 18 D. of original energy to draw on, while the man of 45 had but 3.5 D., then the fall in the first ten minutes in

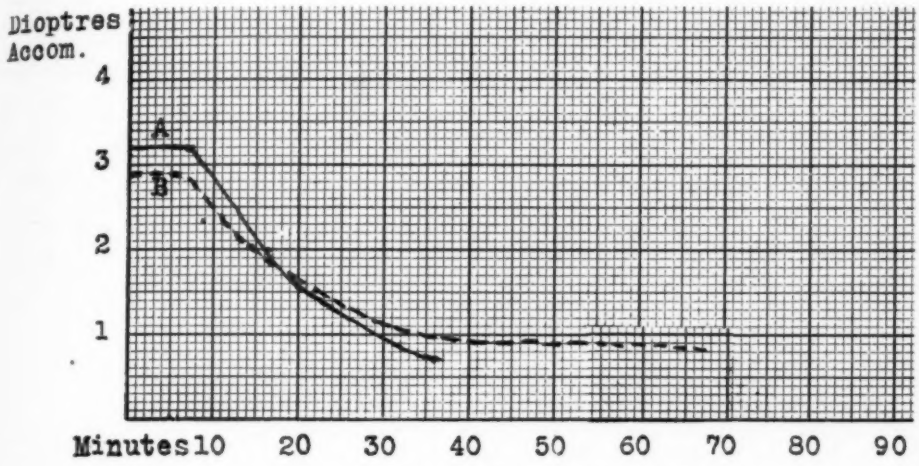

Fig. 2. *A*, curve representing the recession of the accommodation under homatropin in a woman of 45 with an accommodation normal for her age. *B*, similar curve in the case of a boy of 20 with an excessively subnormal accommodation. Note the marked similarity indicating that the physiologic reduction in the one case caused by age is paralleled by the reduction in the other case caused by disease. If the original stock of accommodation (ciliary energy) in the first case was 18 D, then it must have fallen 14.8 D, or 82 per cent, in 7 minutes. It is much more likely that this original stock really only 8 D, in which case Curve D would represent quite precisely a recession in a geometric ratio of 25 per cent every 6 min.

each would be between 40 and 50 per cent, in twenty minutes would be between 50 and 60 per cent, and in thirty minutes between 70 and 75 per cent. There seems no valid reason why this should not be true, i. e., why the accommodation should not drop by approximately equal ratios in both. That the original stock of ciliary energy in the case represented in curve *A* is only 3.5 D. seems also likely from the striking correspondence between curve *A* and the last part of curve *B*. That is, if the progress from the point *M* onward in curve *A* is like that from *N* onward in curve *B*, it seems likely that the progress in the small portion just before *M* and *N* is also alike. If this is so the starting point in the case of curve *A* would not be over 3.0 D.

Curve *A* is not unusual but typical. We may infer from it and from others taken at different ages that the amount of latent accommodation, i. e., the difference between the total and the manifest ciliary energy, does not increase rapidly with age, as has been thought. On the contrary, it either remains of the same moderate amount during life or, more likely, diminishes as the years go on. For the fact that the recession of accommodation under homatropin regularly occurs earlier in the older subjects indicate rather clearly that in them the absolute amount of latent accommodation is less than in the young.

As corroborative evidence we may cite the fact illustrated in Fig. 2 that the curve showing the recession of accommodation under homatropin was essentially the same in a man of twenty with a pathologically subnormal accommodation, and in a woman of forty-five with the accommodation reduced normally by age. In both, the recession began at about the same time, the amount of manifest accommodation before recession began was not essentially different, and the fall was alike in both. The inference seems fair that the fall in amount of latent ciliary power was also about the same in the two, so that the total ciliary power in the two cases was practically

equal. This would mean that the ciliary muscle had its power actually diminished in the one case by age, as in the other case it was certainly diminished by some morbid process.

The demonstration above attempted assumes that the Helmholtz theory of accommodation is correct. If, however, we grant the truth of Tscherning's theory, the facts given will bear a different interpretation. According to the Helmholtz theory, as we have seen, the increasing rigidity of the lens acts simply as a mechanical obstacle to the expansion of the latter, but would not put any traction on the suspensory ligament that would oppose the pull on the latter produced by a contraction of the ciliary muscle. The increasing rigidity, therefore, would not cause the ciliary muscle to do any more work than in the case of the fluid lens.

But according to Tscherning the lens expands by virtue of a direct pressure exerted on it by the ciliary muscle. It is quite conceivable—indeed probable—that such pressure, to produce an effect represented by 3 D. of accommodation would have to be considerably greater in the case of a sclerosed and resisting lens than in that of a fluid lens. That is, a physical accommodation of 3 D. in the middle-aged adult would represent a physiologic effect greater and greater as the sclerosing process advanced, i. e., as age increased. In the middle-aged adult it might well represent a physiologic accommodation of 10-12 D. If this is the case, then it is easy to see how all the facts given in the varying accommodation and the speedy action of homatropin in middle life are compatible with the assumption that the total sum of ciliary energy, instead of decreasing from youth up, as seems necessary if the Helmholtz theory is adopted, either remains the same or, more probably, actually increases during adolescence, to decrease later moderately, if at all.

From the foregoing the following conclusions seem justified:

1. If we accept the Helmholtz theory, then we must admit that the total ciliary energy, instead of being 18 to 20 D. or more at all ages, probably varies not a little in the different subjects at the same age, and in the same subject undergoes a steady reduction year after year, just as in the case of the manifest accommodation. In fact, according to this hypothesis, the difference between the total ciliary energy and the manifest accommodation—which difference constitutes the latent, or unused ciliary energy—instead of growing greater as age advances, either remains the same or more probably grows progressively less and less. The curves indicate that this difference, amounting to 4-5 D. in younger subects, is probably only 1-2 D. in the middle aged.

2. If, however, we accept the Tscherning theory, we may believe that the sum total of ciliary energy, amounting to some 18 or 20 D. in the child, actually increases during adolescence, and decreases but moderately, if at all, in later adult life.

3. Admitting either hypothesis, we can say that a paresis of accommodation can be diagnosticated as readily in a man of middle age as in a youth. For homatropin produces such a paresis, and as the records of many hundred cases show, its paretic effects are produced at least as quickly and can be appreciated as readily in the older subjects as in the younger. And a paresis due to other causes can be made out as readily in a man of forty as in a boy of ten. An accommodation markedly below the lower limit shown in the tables of accommodation which I have elsewhere published can certainly be denoted as subnormal, no matter what the age of the subject.

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OBSERVATIONS ON FUNDUS LESIONS AMONG FILIPINOS.

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MANILA, P. I.

This paper calls attention to certain characteristics of the Filipino eye. It calls attention to the frequency and characters of fundus lesions seen with certain diseases, some of which are more common or seen only in the tropics. Presented to the Philippine Islands Medical Association, December, 1923.

The choice of this subject came to my mind after having read in the excellent book of Elliot on Tropical Ophthalmology, Kirkpatrick's interesting observations on over 500 cases of fundus diseases seen in Madras Ophthalmic Hospital.[1] Two hundred odd cases that came under observation in the Philippine General Hospital are used in the preparation of this paper. An attempt will be made to classify these conditions in the hope of establishing a working knowledge for a more systematic and intensive study in the future of their etiology, relative frequency and other factors which are peculiar in the Philippines.

However, I met with great difficulties at the beginning of this work. In the first place, I could not obtain guidance and assistance from previous works. Secondly, the pressure of routine hospital work deprived me of the leisure time which one would like to have in making such tedious examination as ophthalmoscopy. Lastly, the education of dispensary patients, who composed more than fifty per cent of these cases, is generally so low that it is hard to obtain accurate histories.

There are two or three anatomic points in Filipino patients which should be considered in the examination of the fundus. Their eyeground is more deeply pigmented than that of the blonde Caucasian, the pigmentation varying in intensity as the color of their skin. In some patients the pigment is diffused, while in others it is finely granular. Marked pigmentation requires strong illumination. The macula is more prominent, and in children the "watered silk" reflexes along the vessels are very conspicuous. Again their visual field is relatively wider on the nasal side on account of their noses having a low bridge. This was taken into consideration when perimetry was necessary to check ophthalmoscopic findings in certain diseases, as for instance, in suspicious cases of simple chronic glaucoma. Ishiwara, Kaneko and Sanada[2] have published a work on the visual fields of the Japanese; but since the latter and the Filipinos are not exactly alike I will report in the near future on the visual fields of Filipinos.

FUNDUS LESIONS AND CERTAIN GENERAL AFFECTIONS.

The meager statistics available at present does not permit reliable statement as to the relative frequency of fundus affections in certain general diseases. There are, however, clinical conditions which are often associated with them. According to Kirkpatrick[1] (p. 387) the most important etiology of fundus cases in South India is the following: 1. Venereal disease. 2. Sepsis from the gums and intestinal tract (indirectly). 3. From inbreeding.

Venereal Disease. I have also found, as has Kirkpatrick, that syphilis is the most frequent cause of optic atrophy. This, however, should not mislead one to suppose that syphilis is very prevalent in the Philippines. The atrophy frequently follows mild inflammation. The great majority of those with this lesion resided in the city of Manila and gave definite history of syphilitic infection. The existence of lues in most cases was confirmed by Wassermann test. It was especially common among sailors. Not a few were women who were apparently infected by their husbands, the former showing no suggestion of syphilis other than a history of frequent abortions.

Nephritis. It is claimed that in some cases of nephritis the fundus may show certain characteristic lesions before the more common signs appear in the other parts of the body. In this paper I will not touch on the importance of the ophthalmoscopic examination in the diagnosis of such early cases,

but will simply make a passing mention of some of the fundus cases associated with this disease. Once in a while we see cases of albuminuric neuroretinitis and retinitis, in the medical and pediatric departments, and retinitis of pregnancy in the obstetric wards. One case of antepartum eclampsia, in which vision was lost just after a severe attack of convulsions, showed on examination a very severe neuroretinitis, and then after emptying the uterus gradual recovery of vision followed until a few months afterwards it became almost normal. A case of albuminuric retinitis was seen in an old woman from the medical ward with generalized arteriosclerosis, blood pressure about 200, the patient dying after a short stay in the hospital.

Diabetes. Diabetes is not frequent among Filipinos, and the severe type is rare. This is the finding of Concepcion.[3] Other observers have noted this disease to be more common in other countries in the East. Elliot (1, p. 502) for instance says that, "This disease (diabetes) is extraordinarily common in the East." So far we have not met with a typical case of diabetic retinitis. In this connection I may say that in our cases of cataract—a disease that is very frequent here, we have very seldom observed sugar in the urine.

Beri-beri. Beri-beri amblyopia presents points of interest altho it usually does not give noticeable fundus findings. In young mothers suffering from beri-beri, this eye symptom may appear during pregnancy or puerperium. Since we began to observe more closely these cases of amblyopia we have seen only mild cases, presenting deficiency of vision which was not poorer than 20/40, and never, of course, blindness. I have described in a previous paper[4] these symptoms. They are principally slightly dim and smoky vision; eye easily gets tired and easily dazzled in bright light; fundus usually negative, altho some with slight blurring of the disc margin. A most constant finding in those cases was the contraction of the visual field for green. Central scotoma is the most prominent symptom in those cases observed by Elliot, Miyashita and others (1, p. 407). In our few cases we did not observe this well known symptom of beri-beri amblyopia. Is it because those cases that came to our attention were only mild ones, or are there some differences between certain clinical manifestations of beri-beri in the Philippines and those observed in other tropical countries?

Malaria. Malaria is very common in the Philippines. Malarial cachexia is characterized by profound anemia, and the retina of course will show such changes as marked paling of the fundus, marked pulsation of the vessels due to low blood pressure, etc. We have not, however, as yet met with cases of retinal hemorrhage in malaria. One case of profound anemia in a pregnant woman with chronic malaria of very long standing came under our observation. The fundus was very pale due to extreme anemia and the patient died soon after delivery.

Pernicious Anemia. We have seen retinal hemorrhages in two patients with pernicious anemia, bleeding of the gums and other signs of the disease.

Toxic Amblyopias: Quinin. As I have said elsewhere malaria is very prevalent in the Philippines and quinin is widely used for its cure and prevention. But fortunately cases of poisoning are apparently rare. We have not met with a case in the Philippine General Hospital. I have seen only one case of optochin amblyopia in a private patient of my colleague, Dr. H. Velarde. The vision was reestablished after some time. Many Filipinos are heavy smokers and in the northern provinces where tobacco is the principal product, even children and women indulge in this habit. But it is strange indeed why so far we have not met with a frank case of tobacco amblyopia in Filipinos. In passing I may mention that we have here comparatively few drunkards. It is interesting here to note the observation of Meyerhof[5] that, during a period of eleven years practice in Egypt, he observed tobacco amblyopia in only three out of thirty thousand patients and those were not natives. The only case

I have seen was in a European who used to smoke and drink much.

Sepsis from Intestinal Tract: Dysentery. Helminthiasis favors bacterial and protozoal infections of intestines, and according to Kirkpatrick (1, p. 390), a certain number of cases of optic neuritis might directly be due to dysentery. His statistics show that 13% of cases of acute neuritis had attacks of dysentery within twelve months of onset of eye symptoms. This eye symptom in dysentery has not come yet under our observation.

Ankylostomiasis. The incidence of ankylostoma infestation is very high, especially in certain provinces according to the reports of the Philippine Health Service. The profound general anemia caused by heavy infestation with this parasite show changes in the fundus. Comparatively few of these cases have come to the hospital.

Oral Sepsis. Oral sepsis is recognized by ophthalmologists as an indirect cause of certain eye lesions. According to Kirkpatrick (1, p. 388) it is found in over 47% of the cases of fundus disease at the Madras Hospital. He says that it has a large influence over causation of diabetes which is so common among the well-to-do in South India. He further said that pyorrhea has probably an influence on the arteriosclerosis and thus may be an indirect cause of many cases of retinitis. In the Philippines pyorrhea is also common, but unfortunately no systematic observation on its relation to certain eye inflammation has yet been made.

FUNDUS LESIONS SECONDARY TO PRESSURE OR INFLAMMATION IN ADJACENT ORGANS.

Orbital Tumor. We had two cases of lacrimal gland tumor producing pressure symptoms on the nerve. The optic neuritis disappeared after the removal of the tumor.

Cerebral Tumor. We have seen occasionally cases of choked disc secondary to brain tumor. A child was referred to us with typical symptoms of brain tumor. The fundus presented marked papilledema on both sides. The patient died shortly afterwards, and on autopsy there was found glioma of the temporal lobe of the brain. We had three cases of malignant growth starting from the nasopharynx, involving the base of the skull, causing choked disc, and later atrophy of the optic nerve. The diagnosis was confirmed postmortem. Recently we have examined a boy, 12 years of age, well nourished, complaining of more or less sudden attacks of headache, and poor vision. Bilateral choked discs were found. After about two weeks, to our great surprise the symptoms disappeared without any treatment. What was the cause of this transient papilledema we were at a loss to explain.

We had two cases of advanced hydrocephalus with loss of vision due to atrophy of the optic nerves.

Extension of Inflammation to the Nerve. Suppuration of the accessory nasal sinuses may extend to the eye chiefly thru the optic nerve. I have seen a case of advanced empyema of the maxillary antrum involving the orbit, and producing cellulitis, loss of vision and symptoms of meningitis. We have also seen three cases of retrobulbar cellulitis, cause not definitely determined, producing some inflammation of the nerve.

LOCAL CONDITIONS CAUSING FUNDUS LESIONS.

Glaucoma. This is taken up in this paper just to emphasize the fact that altho glaucoma is common in these Islands, the cases that usually come to us come with acute symptoms, media very turbid, vision almost totally gone, and therefore cupping of the disc can no longer be recognized. The apparent rarity of the simple chronic cases is explained by the common belief among the majority of the ignorant natives that failing of vision is a natural penalty of old age, and that the headache that usually accompanies the condition is regarded by them as insignificant and independent.

Detachment of the Retina. There are four cases of this condition in this series, all presenting more or less atrophy of the optic nerve. Unfortunately we could not account for the

exciting cause. One of the cases developed secondary glaucoma. In this connection I wish to state again that in many instances we could not get accurate history from the patients to help us in our diagnosis. Retinal detachment due to high myopia seems to be very rare. Marked degree of myopia is apparently not frequent among Filipinos.

Retinitis Pigmentosa. In South India there are comparatively many of these cases. According to Kirkpatrick consanguinity is traced in 60% of the general Indian population, and retinitis pigmentosa is found in 12% of the fundus cases. The Filipinos are, however, almost all Christian, and cases of inbreeding are rare. We have observed only four cases of retinitis pigmentosa, one, an Igorot student, another, a boy from Palawan; one, from Caloocan (Rizal); the fourth, from Laguna; and only one of those gave a history of consanguinity.

In this connection I wish to say a few words on *nightblindness* which occurs without xerosis of the conjunctiva. In such cases the ophthalmoscopic examination will decide whether or not we are dealing with retinitis pigmentosa. In a previous paper[4] I have raised the following question: Is the nightblindness which is not associated with xerosis of the conjunctiva, occuring mostly among poor children, due to certain deficient nutrition manifesting itself as peripheral neuritis which we call beri-beri? This is brought up again because in a case of rudimentary type of beriberi (diagnosis confirmed by clinical and X-ray findings), nightblindness was noted to be one of the most prominent complaints. Was the nyctalopia produced by beri-beri, or was it due to other causes? In Elliot's Tropical Ophthalmology there can be found an excellent discussion on this subject of nightblindness in the tropics. He quotes Stephenson as saying that nightblindness has been described by a number of writers in the British Isles, especially occuring among school children of the poorer class, amongst whom it is stated to have a tendency to recur, but to be without permanent influence either on the eyesight or the general health. Elliot further states that there is no necessary relationship between xerosis of the conjunctiva and the nyctalopia; either may occur without the other. They are, however, due to the same cause. In the particular case I mentioned above, the nightblindness disappeared with the ordinary treatment of beri-beri.

Epidemic nightblindness is observed here in settlement houses, orphanages and other places where poor diet is usually served. Recently there came to my attention a patient with this complaint who was employed in a lumber company, and working in the forest of Bataan. I have been told that several of them have been suffering from this trouble, and upon further inquiry I was able to bring out that they were getting unbalanced food. The strong rays of the tropical sun under which they are working, of course, can not be disregarded as a contributary factor in the etiology.

Injuries. We have had a number of cases of intraocular hemorrhage due to a blow in the eye. The less prominent orbital ridge and low bridge of the nose of Filipinos offer less protection to the eyeball. I have seen hemorrhage in the macular region in a patient with a history that he was kicked by a horse in the face. Again in three boxers I have seen floating bodies (blood clots) in the vitreous. I have seen a patient who complained of marked scotoma after playing a ball game. His position in the diamond was with his face toward the sun, and this could account for the condition.

Congenital Anomaly. We had one case of unilateral small eyeball, with vision very deficient. With plus 7 diopters the disc could be seen, normal in appearance except for its diminutive size. A case of medullated nerve fibers was seen by the writer, during a routine examination of a patient suffering from paralysis of accommodation and convergence after epidemic encephalitis, the medullated fibers being mostly at the temporal side of the disc. An albino patient was referred to us for some trouble in the throat, but the fundus was examined. The fundus

findings were very characteristic. Albinos are occasionally met with in these Islands.

Optic Atrophy of Nonsyphilitic Origin. Before concluding I would like to say a few words about those cases of optic atrophy in which syphilis as the primary disease has been ruled out. There are many patients with this lesion in whom we can not find the causative factor. Many of them came from the agricultural provinces. As Elliot has suggested, the following factors should be given due consideration in tracing the origin of obscure cases of optic atrophy, autointoxication, and septic foci, especially in patients debilitated by chronic condition as malarial cachexia or chronic dysentery, etc. Inasmuch as in other countries in the tropics quinin poisoning has been responsible for this affection of the nerve, this drug should receive due consideration as an etiologic factor.

SUMMARY.

The writer is fully aware that the present paper is deficient. But he could not resist the temptation of starting this work on the subject which he considers essential for the progress of ophthalmology in the Philippines. It is hoped that the work herein reported will be corrected, enlarged as we acquire more experience. More "intelligence behind the ophthalmoscope" and more improved methods of investigation are all essential factors of high grade work in ophthalmology.

I wish to acknowledge my indebtedness to Prof. Daniel de la Paz, for his many kind suggestions in the preparation of this work, and to Col. Elliot for the free references to his excellent book on Tropical Ophthalmology.

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LASTING PARALYSIS OF ACCOMMODATION AFTER USING CYCLOPLEGICS.

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This has been ascribed to the cycloplegic, but no such case has been found in which it is known the accommodation was normal before a cycloplegic was used. Cases are cited from the literature and reported from the writer's practice which might easily have been misinterpreted as permanent cycloplegia produced in this way. Read before the Colorado Congress of Ophthalmology and Oto-Laryngology, August, 1914.

If its title read: "Due to the Use of Cycloplegics," this paper would closely resemble the famous chapter on snakes in Ireland: "There are no snakes in Ireland." There is a general impression that sometimes the paralysis of accommodation produced by a cycloplegic drug may be permanent. A fear of such a result is sometimes expressed by patients and its possibility is held in mind by ophthalmologists. I have long believed that this fear had very little foundation in experience; but only on investigating the subject did it become clear that this impression was wholly without substantial foundation.

Even a myth does not exist without cause, or continue without support to give it currency. There are several things that have helped to keep this one alive. The paralysis of cycloplegics often lasts longer than is generally supposed. Before it has passed away, pathologic changes may occur in the eye that do cause permanent im-

pairment of vision. Permanent mydriasis, altho very rare, does occur, mostly in connection with glaucoma, but sometimes apart from that. Permanent impairment of accommodation from causes other than the use of cycloplegics is not very rare, and may arise in coincidence with the use of a cycloplegic; or may exist before the cycloplegic is used and remain undiscovered. A rather extended search of the literature shows not one single case that cannot be explained upon one of the lines above indicated and not a single case in which the condition of the accommodation was noted before the use of the cycloplegic.

In my own experience of several thousand cases in which the condition of accommodation was noted in every case before using a cycloplegic, there has been no case, in which any impairment of accommodation was found from it, one month after discontinuance of the use of the drug; apart from three cases in which cycloplegia was followed by an outbreak of acute glaucoma.

There is no case in the literature, in which it was observed that accommodation was normal before the use of the cycloplegic, that it did not return to normal within a month after discontinuance of the drug; apart from other causes that are known to produce impairment of accommodation. When carefully examined, the supposed evidence of permanent loss of accommodation from cycloplegics becomes quite insufficient. It would be unwise to assert that such lasting paralysis of accommodation following cycloplegia cannot occur, but apparently it has not been proved.

Let us consider more closely the various sources of this misapprehension. I have seen complete recovery of accommodation twenty hours after the use of homatropin; but I have also seen recovery delayed until seventy-five hours. There are 3 cases on record, [1-2], in which the recovery required periods of 5, 8 and 15 days. It is often stated that recovery from mydriasis by atropin requires a week. Sometimes it does seem complete within a week; but generally it requires fully two weeks and in a few cases more than three weeks; and it has been known to require several weeks.

During a period of three or more weeks, other well recognized causes of impairment of accommodation can produce quite important changes. There are many causes producing paresis of accommodation of which well authenticated instances are on record. I have seen impaired vision, blamed on a mydriatic, that was really due to albuminuric retinitis, advancing cataract, retinal hemorrhage, extending retinal detachment, uveal inflammation and vitreous opacities; and, with more reason, to outbreaks of glaucoma.[4] Even presbyopia may reach a certain point without stopping near use of the eyes; and then the eyes suddenly refuse to keep up the effort; and reading, previously done habitually, becomes impossible. This has happened when no cycloplegic has been used, as well as following cycloplegia. In all such cases reasoning based on "post hoc propter hoc" is fallacious; and on such a basis does belief in permanent paralysis of accommodation after cycloplegia rest.

In the transactions of the American Ophthalmological Society, O. F. Wadsworth[5] reported a case of mydriasis following the use of atropin, which continued four months; and then one eye very slowly recovered a normal pupil under weak solutions of miotics, while the other pupil remained slightly dilated after 18 months. In the discussion of his paper, two similar cases were mentioned, one of them lasting 10 years before the pupils were restored to normal size. But in these cases the power of accommodation seems to have been restored to normal in about the usual time. One case, however, is referred to, that of a woman of "nervous temperament" whose accommodation remained paralysed along with the dilated pupils after 5 or 6 years; but no details are given to enable us to judge of the real significance of this case.

It might be supposed that if such prolonged mydriasis followed the use of a cycloplegic, paralysis of accommodation might accompany it.

The significant fact is, that in most of these cases, it certainly did not. Prolonged mydriasis cannot be assumed to be evidence of prolonged cycloplegia. The recorded cases show that it is not. Since the pupil may remain dilated, when the accommodation has been restored, it is possible that accommodation might remain paralysed even when the pupil had contracted, but no case of this has been reported. In general, as the effect of a cycloplegic wears off, the accommodation is almost or quite recovered, while the pupil still remains markedly dilated. Very weak solutions of atropin and other cycloplegics dilate the pupil without noticeable effect on the accommodation. Diphtheria may cause paralysis of the accommodation without dilatation of the pupil, but cycloplegic drugs do not, except in cases where the pupil is incapable of dilating.

There are many causes for paretic accommodation. It may be congenital. M. C. J. had congenital amblyopia and nystagmus. At nine years old, her corrected vision was 0.12 in each eye. When she was twelve, it had risen to 0.18 in each. She held things close to her eyes to see them, but required for distance the correction:

R+4.25⊂—1.75 cyl. ax. 178°
L+4.50⊂—1.75 cyl. ax. 2°

By objective testing (skiascopy) she was found unable to attain more than 4.5 D of accommodation, even with strong convergence. For reading +2.75 D was added to her correction for distance.

McF. H., aged 6, "always had eyes crossed." His grandmother had crossed eyes, left deviating. Vision: R. 0.7; L. 0.4. There was H.1 in each eye and accommodation not over 6 D.

L. M., aged 18, was found by cover test to have 2 centrads esophoria for distance and 10 centrads for near.

R+1.75⊂—3.25 cyl. ax. 3° V=1.1
L+1.⊂—3.25 cyl. ax. 176° V=1

With them her near point showed only 4.5 D of accommodation.

Mrs. K. N., aged 27, subject to "sick or nervous headaches all her life" required for distance:

R+2.75⊂—0:50 cyl. ax. 100° V=0.6
L+2.50 sph. V=0.5.

Her near point with these was twenty-four inches. She was given 2. D convex additional for near seeing, which made her "eyes very much better."

E. E. W., physician, aged 30, with his correcting lenses for distance had accommodation of only R.4. D.; L. 4.25 D; and no history of a pathologic cause.

Miss M. M., aged 22, bookkeeper, had V=1.+ with each eye but her accommodation was only 5 D. in each.

McG. J., aged 43, always neurotic, doing close office work had low myopic astigmatism and accommodation of only 1.50 D, requiring +1.50 D for reading.

Such deficiencies have led to most illogical treatment.

J. L. M., aged 15, took for distance:
R—0.25 cyl. ax. 15°
L—0.37 sph., giving V=1.2 in each eye.

He had but 3.5 D. of accommodation in each eye; and was given +1.50 added to the distance correction for reading. This boy had been kept under atropin for nine weeks, going twice daily to the office of the oculist to have it instilled. There was no reason to believe that his eyes had been made worse by this treatment, which had probably been kept up in hope of unmasking a latent hyperopia. His symptoms had simply continued in spite of it. His eyes behaved as normal eyes usually do under homatropin, showing the same accommodation after as before its use. He was entirely relieved of his headache, which commonly came on in the morning when he had been in school an hour, by wearing for near work 1.50 sph. added to his distance correction.

Except possibly congenital weakness, the most common, single cause of paresis of accommodation is diphtheria. This produced 31 of 103 cases noted by Helbron[5] among 300,000 patients in the Eye Clinic of the University of Berlin. Donders[7] reported four cases occurring in an epidemic in the Netherlands; and Bijlsma[8] reported forty-six cases. Fromaget[9] reported a case in which a postdiphtheritic paralysis of accommodation recovered, and then recurred two months later. Cases of this origin almost invariably re-

cover. The writer had such a palsy. It was complete for two or three weeks and was followed by complete recovery. About twelve years later, he had a slight, brief paresis following influenza. Except during these periods his accommodation has always been rather above the average for his age, being now at sixty-eight about 0.75 D.

Syphilis comes next in etiologic frequency with nineteen cases in Helbron's series. It is more likely to cause permanent impairment[10] but often yields to proper treatment.[11] Next I would place influenza, altho Helbron does not mention it, and after this, typhoid fever. Mumps, measles and scarlet fever have accounted for isolated cases and I have seen one following a heat stroke. Plaut[12] ascribes twenty-three cases that he saw in patients of seventeen to nineteen years of age to anemia and chlorosis. Recently focal infections have been reported as causing paralysis of accommodation. Veasey[13] has reported five cases in which recovery rapidly followed removal of teeth and tonsils.

In none of the papers, above referred to, is use of a cycloplegic referred to as a cause of lasting paralysis of accomodation. Regarding the case mentioned in discussion of Wadsworth's paper, no details, not even the age of the patient or the tests made, are given. It is entirely possible the paralysis of the accommodation was assumed, because the pupil remained dilated.

In the only other report of such a case,[14] recently published, the probabilities of error as to etiology are well illustrated. The patient was a man, aged 36, who came "complaining of pain or headaches in the back of the head, worse after doing close work." Before using homatropin, he had poor vision which was improved by correcting glasses:

R,20/100+1.50 sph.⊂+0.50 cy. ax. 95° =20/40

L,20/40+1.50 sph.⊂+1. cy. ax. 85°= 20/30

There is no record of his accommodation before using the homatropin. After ten days his pupils were normal, but he still needed more help of convex glasses for near work than was given by his ametropic correction. He was given +2.50 added to his full correction. It is impossible to draw conclusions as to the accommodation where the near point of distinct vision, or the amplitude of accommodation, at any time, has not been observed and reported.

Judged by the general experience, there are several explanations more probable than that lasting paralysis of accommodation was caused by the homatropin. Patients are seen needing added convex lenses for near seeing from childhood. In a series of 3,346 cases of refractive anomalies seen in private practice,[15] the following cases of reduced accommodation were found:

Under 20 years	3.25	D
Under 30 years	2.50	D
Under 40 years	2.	D
Under 50 years	0.	

There is need for the careful taking of the near point of accommodation in every case requiring correction of ocular refraction. Cases, apparently contradicting the general experience regarding lasting paresis of accommodation following the use of cycloplegics, can hardly be accepted as proving anything without complete data regarding them.

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OBSTRUCTION TO CENTRAL ARTERY OF RETINA DURING AN INTRANASAL OPERATION.

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In this case the right eye became totally blind during operation and remained so for five days. But subsequently it regained useful vision. Somewhat similar cases previously reported are reviewed and the possibility of embolus passing from the nose to the retinal vessel without going thru the pulmonary circulation is discussed. Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, October 16, 1924.

It is generally accepted that most cases of obstruction to the central artery of the retina are of thrombotic origin. The reason for this lies, not only in the finding of the pathologist, but also in that of the clinician. The former discovers definite proof of an embolus in but few instances, and the latter rarely finds a possible source of an embolus in the patient. Furthermore, the anatomist points out that the arteries concerned in the retinal blood supply come off from one another in such a way that it is difficult for an embolus to find its way into the central artery of the retina. In most cases the source of the embolus is the valves of the heart. In the case here reported it is probable that the obstruction was embolic and that the embolus came from a blood clot formed in the nose.

F. M., a boy 18 years of age, was seen by me one year following the loss of sight. He gave the history that while undergoing an intranasal operation the right eye went totally blind and remained so for 5 days. The sight then gradually improved for about three months since which time it has remained stationary.

The surgeon, Dr. J. J. Monahan, of Shenandoah, thru whose courtesy I am reporting the case, wrote me that he was doing a right turbinectomy when the patient complained of failing vision. The operation was immediately stopped and the nose packed. The packing was removed the following day. For 5 days there was only light perception.

When seen by me the vision in the right eye was 5/15 eccentrically, and in the left 5/5 pt. The pp. of accommodation in the right eye was 8 cm. The right pupil measured 7.5 mm. and the left 5.5 mm. In the right eye the pupil was very sluggish to direct stimulation but prompt consensually. In the left it was prompt directly and consensually.

The ophthalmoscope showed: Right eye, media clear, disc vertically oval and quite atrophic, the margins as well as the lamina cribrosa well defined. The perivascular spaces were well marked, particularly along the superior temporal vessels. Down and in from the disc was a small area of epithelial absorption in the retina. There were well marked foveal reflexes. The arteries were constricted and too bright. Left eye, media clear, disc vertically oval, upper and lower margins veiled, two large macular arteries. H.=1 D.

The patient was seen by Dr. George Morley Marshall on August 26th, 1924, who made the following report: There was a large mass pendent from the middle turbinate bone, about 3 cm. in length and about 1 cm. in thickness. The circulation in the mass was good. Dr. Marshall removed this mass, which was probably the result of the incomplete turbinectomy which was being done at the time the blindness occurred.

In October, 1917, Dr. Francis R. Packard reported a case of a man, aged 26, where under cocain anesthesia, with a cold snare, a piece of hypertrophied tissue was removed from the anterior extremity of the middle turbinate bone of the left side. The patient stated that the following day while writing he suddenly became blind in the left eye. The period of complete blindness lasted from 20 to 30 minutes. He went at once to an oculist and while waiting, the vision began to return. Before the examination was completed vision was entirely restored. No cause was found by the oculist. The next day the site of the operation presented a perfectly normal appearance.

According to Packard, Zeim was first to direct attention to amaurosis following intranasal operations. He reported several cases of temporary dimness of vision following galvanocauterization of the turbinate. In 3 instances there was hyperemia of the optic nerve, and in one, marked congestion and venous pulsation of both optic papillae. Packard places his and Zeim's cases under the head of nervous complications.

Thorner records a case similar to that of Packard. The day following the use of the actual cautery to the middle and lower turbinate in the right side, vision in the corresponding eye became reduced to bare light perception. The vision improved in 5 days and was fully restored within 4 or 5 weeks. No ophthalmoscopic changes were noted.

Lermoyez cites Rosenberg's case where there was complete loss of vision, lasting several minutes, follow-in galvanocauterization.

Packard states that the arterial supply of the nose is derived chiefly from branches of the ophthalmic and internal maxillary arteries, which form a mesh beneath the mucous membrane. Some of the veins from the nose empty into the ophthalmic vein, others into the facial vein, and some terminate in the veins within the cranium.

Following the introduction of the procedure of injecting paraffin subcutaneously, for the correction of nasal deformities, several instances of unilateral blindness were reported as occuring at the time of the operation.

Zahn, who reported a case from Schleich's clinic, collected six others. In 3 the cause was assigned to embolism of the central artery of the retina and in 3 to thrombosis of the central vein of the retina.

Silberstein in recording a further case believed the ultimate cause to have been a thrombosis of the frontal and ophthalmic veins.

In Leiser's case there was edema of the lids as well, and his explanation is that there was thrombosis of the ophthalmic vein. Holden, commenting upon this, says that thrombosis of the ophthalmic vein far back, or of the cavernous sinus into which it enters, might have accounted for the symptoms; but that it is remarkable that a foreign body entering a small vein should pass centripetally toward the heart and be caught in a vein of much larger caliber.

In Hurd and Holden's case several injections had been given before. The one that was associated with blindness was given from the tip of the nose up and from the bridge down, on the right side. Immediately blindness occurred in the right eye. Examination by Holden 25 minutes later showed no retinal haze, the main inferior branch of the central artery of the retina and its divisions were empty and collapsed, being recognized by a faint red outline of the lateral walls. The main superior branch contained some blood but when pressure was made on the eyeball the blood column broke up and the blood flowed backward to the central artery.

At a meeting of the Section, in November, 1921, Dr. George H. Cross reported a case of a man, aged 29, with a bone felon, who developed the ophthalmoscopic picture of an obstruction to the central artery of the retina which he attributed to a septic embolus.

Uhthoff thinks the most likely explanation that the injection entered the venous channels, and then after passing thru the lungs, entered the arterial system and finally the central artery of the retina.

Elschnig assumes that the paraffin entered directly into a peripheral branch of the affected ophthalmic artery, and then took a centripetal direction against the arterial current and entered the central artery of the retina where it is given off from the ophthalmic artery.

Thru an explanation offered by Dr. Evan Evans, Hurd and Holden get around the difficulty of a passage thru the lungs, by assuming the persistence of a patulous foramen ovale, and that the paraffin particle passed thru from the right to the left auricle of the heart.

Kirschstein thinks that the paraffin entered directly into the lymph spaces, then to the perivascular lymph spaces of the central artery of the retina and here, by outward pressure, constricted the vessel until it was completely obstructed.

Zahn, in reporting his case from Schleich's clinic, rejects the theories advanced and argues that while cases of paraffin injection never produce embolism in other organs, especially the lungs, a large number of urogenital injections produce embolism of the lungs, but never of the eye; a direct relation must therefore exist between injections in the nasal area and the obstruction to the central artery of the retina.

In a personal communication from Dr. J. Parsons Schaeffer, Director of the Daniel Baugh Institute of Anatomy, regarding the way in which an embolus from the nose could reach the central artery of the retina he says, "It is not clear how the central artery of the retina becomes occluded during the performing of an intranasal operation. The cavernous spaces of the nose are, of course, freely opened in an operation and it is possible that air, particles of a clot, etc., are admitted into the venous side of the blood vascular tree. These emboli would be carried to the right side of the heart and by way of the pulmonary artery to the lungs. One would not expect such emboli to pass beyond the capillary bed of the lung. However, it appears that this does occur at times. Of course, one must not forget that the foramen ovale is at times anatomically and physiologically patent—also the ductus arteriosus. Patency of these structures would preclude the necessity of blood from the right side of the heart passing thru the lungs before reaching the systemic aorta. Equally, emboli could pass directly from the right to the left side of the heart and into the arterial side of the systemic circulation.

One must also think of a thrombotic process extending backward from the cut end of the artery or arteries to the main stem artery, and a particle of such clot finding its way into the central artery of the retina. This explanation can hardly apply if the mishap occurred during the operation.

Direct or indirect trauma to the blood vessels in the orbit might be a factor. The nature of the operation would of course decide this. Again, is the eye condition just a coincidence and the result of an embolic mass breaking away from the left side of the heart; this occurring during the operation?

The whole problem of embolism is not well understood and until such time that we have a clearer conception of the process I fancy that the underlying factor in the present case cannot be stated with certainty."

Despite the difficulties in the way of routing an embolus from the nasal capillaries into the central artery of the retina, the symptoms in most of the cases indicate an embolus as the probable cause of the blindness. The question might be settled by animal experimentation.

Observations in the future should be made to determine whether the eye on the side corresponding to the injection, in cases where paraffin is injected, is the one always affected.

The fact that the eye affected was on the same side as that on which the intranasal operation was performed, favors the view that in some manner the route is more direct than transit of the clot thru the lungs.

MICROPHTHALMOS WITH CYST FORMATION.

M. F. WEYMAN, M. D.

LOS ANGELES, CALIFORNIA.

Soon after birth this condition was noticed but the cornea was quite visible. Later enlargement of the cyst occurred entirely hiding the cornea and hindering complete closure of the lids. For this, cyst and eyeball were removed. The cyst communicated with the subretinal space, apart from the usual position of the fetal cleft.

Beer, in 1813, was one of the first investigators to call attention to the congenital anomaly of microphthalmos. Since that time it has been described in its various phases by many observers. As yet, there has been no definite satisfactory explanation of its origin. There are those who believe that it is caused by intrauterine inflammation, and those who believe that heredity has an influence upon its occurrence. The figures of Loeb tend to support this latter theory, altho many cases are reported without any known previous occurrence in the family.

The microphthalmic eye tends to be not only small in all its details, but has association in most cases with other defects of development, the most common of which is coloboma of the iris. Other defects are persistent pupillary membrane, absence of lens, cataract, retinal separation, and cyst formation. Vision in such an eye, if any, is usually limited to light perception. The ocular movements are often normal, and there is often a nystagmus.

In cases of simple microphthalmos the eye usually gives no great amount of trouble and may be retained thruout life. In the case of cyst development, as here to be reported, there is usually such an increase in size of the cyst that its removal is necessary. The types of cyst formation will be discussed under the description of the cyst herein noted.

In the present case the patient was first seen by me on March 29, 1924. He was a well developed child, eighteen months old, with the following history:

At birth it was noticed that the right eye was closed but nothing abnormal was noted until the fourth day, when the eye was examined by the parents. Upon opening the lids the father said that he noticed a small eye. The child was taken to an oculist at this time; and he advised him that there was a possibility of vision, and to leave the eye alone. The parents then noted that the orbital contents seemed to enlarge, and continued to do so for five months. At this time growth seemed to be halted. The father no longer noted the small eye but the space between the lids seemed to be occupied by a white mass with no visible cornea.

The mother and father are both healthy, and there is a perfectly normal sister of the child. There is no history of any congenital trouble of any relatives.

Just before the child was brought to me, the mass seemed to start growing again. Upon examination, I found the patient to be mentally alert, and apparently normal in every way except for the appearance of the right eye. He was able to open and close the lids, but with the lids open there presented between them a mass covered by conjunctiva with apparently sclera beneath, which was thinned in spots, so that areas of pigment showed thru. No sign of a cornea was visible. Upon palpation the mass fluctuated and was fairly soft. It was freely movable in the orbit and not tender. Transillumination showed no opaque masses. Upon the basis of the history and examination a diagnosis of microphthalmos with cyst was made.

Upon examination of the left eye the pupil was normal, reacted to light and accommodation, and the media and fundus were normal. The child observed objects and could name objects seen thru the window.

As the parents were reluctant to have an operation done at the time and as there was no evidence of malignancy, observation of the growth was advised. On later examinations, however, the mass was seen to be enlarg-

ing to a point where the lids could hardly be closed and enucleation was done on September 17, 1924.

During removal the cyst was punctured and a reddish brown fluid escaped. As the cyst collapsed there came into view from behind it the microphthalmic eye from which it arose at the lower portion. The eye and cyst were removed with difficulty as there were firm adhesions to the orbital wall. The conjunctiva was brought together with a single stitch and a good socket left. In the orbit the cyst was found to occupy the position as indicated in the diagram in Figure 2. The conjunctiva was reflected up over the anterior portion and the eye was completely concealed. A portion of the cyst wall was removed for sectioning and the specimen placed in formalin which caused the shrinkage in the cyst, giving it the appearance as in Figure 1.

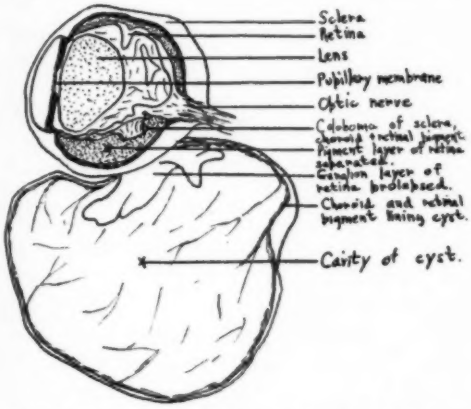

Fig. 1. Diagram of section of microphthalmic eyeball and attached cyst, 1½ times natural size.

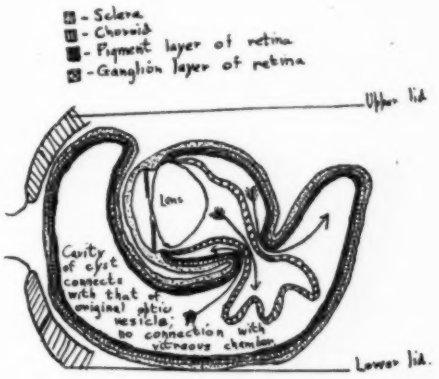
- Sclera
- Choroid
- Pigment layer of retina
- Ganglion layer of retina
Upper lid
Lens
Cavity of cyst connects with that of original optic vesicle; no connection with vitreous chamber
Lower lid.

Fig. 2. Diagram showing relation of retina to opening in eyeball and attached cyst, in Weyman's case.

The eye is about one centimeter in diameter; and the cyst arises from its lower temporal portion, by a stalk about five millimeters in diameter. Upon sectioning the eye the appearances are semidiagrammatically shown in Figure 1. There is a persistent pupillary membrane, but no coloboma of the iris. The lens is rather large, and there is a separation of the retina, which latter membrane is thickened and thrown into folds which occupy a large part of the vitreous cavity. In the lower temporal quadrant is an ectasia of sclera, choroid, and pigment layer of the retina about one by two millimeters. This widens out and becomes the cyst wall. Thru this opening is prolapsed a fold of the ganglion layer of the retina. By ganglion layer of the retina I speak from an embryologic viewpoint, dividing the retina into its original layers, pigment and ganglion.

Thus we see that the cavity of the cyst is not continuous with that of the vitreous, but is connected with the subretinal space, or the cavity of the original optic vesicle. And, as shown in the diagram, Figure 2, the wall of the cyst must have been originally the sclera, choroid, and the pigment layer of the retina. Of course, in the specimen these layers have been so stretched and compressed that they are no longer distinctly demarcated, but evidences of them are present. The other type of cyst that occurs is one in which the cavity of the cyst is continuous with that of the vitreous, and must of necessity be lined by retina also.

Dr. C. W. Bonynge, who made the sections for microscopic examination, reported that there was no evidence of malignancy, but a marked chronic inflammatory reaction was present in the tissues surrounding the cyst wall. The cyst had a flattened epithelial lining, and contained numerous pigmented cells in its walls, these latter being derived from the choroid and pigment layer of the retina in the original

ectasia. These were surrounded by a fibrous membrane corresponding to the sclera. As was expected, no tissue resembling retina was seen in the cyst wall.

As this cyst was not in line with the usual line of closure of the choroid fissure, or fetal cleft, which lies in the lower nasal quadrant, and as it was unassociated with any coloboma of the iris, we must look for some explanation other than malclosure of the fetal cleft for its origin. The one that seems most obvious from the anatomic relations would seem to be that there was a temporary rise of cerebrospinal pressure while the optic vesicle was yet in communication with the ventricle; and that an ectasia occurred at what happened to be its weakest point, in this case the location of the cyst. Then when invagination of the vesicle occurred, and the inner layer prolapsed into the ectasia now formed, it may have acted as does the choroid plexus in the cerebral ventricles and caused the secretion of fluid; thus distending the ectasia and causing it to enlarge. The fluid content of the cyst corresponds in position to that found beneath the retina in retinal separation.

The unusual features of this cyst are that it was found in connection with an otherwise perfect microphthalmos, and that its point of origin was removed from the line of closure of the choroid fissure.

CONGENITAL MEMBRANOUS CATARACT.

E. K. Findlay, M. D.

CHICAGO, ILL.

A case of congenital membranous cataract is here reported. From one eye the membrane was extracted, thru a keratome incision, with an iris hook. The microscopic examination showed inclusion of lens fibers in the membranous opacity. Read before the Chicago Ophthalmological Society, October, 1924.

Congenital abnormalities are due to arrested or faulty development. Many theories are advanced to account for the various deformities, and Deutschmann considered that they were all due to an inflammatory process. There may be defective development of fetal bloodvessels, placental changes, or diseases transmitted from mother to the child thru the blood stream. As it is difficult to obtain a scientific family history, it is impossible to state how far heredity is responsible for many of these defects.

Alterations in the lens are not uncommon, and when we consider this walled in, epiblastic structure, that develops so rapidly at an early stage of fetal life, we can readily understand how it would be affected by any vascular changes. Membranous cataracts are not of common occurrence, and their cause has given rise to considerable speculation. Beard, in his work on Semeiology and Diagnosis, prefers the name cataract siliquose for this congenital condition. This name is derived from the botanical term used for a fat oval pad between the two layers of which seeds are placed. This term implies that the lens became swollen, broke down and was partially absorbed. The term membranous cataract he reserves for those where the anterior and posterior capsules are in contact thruout, with no intervening substance. He quotes from L. Dor, Sr. "There are two types, one in which as a consequence of anomaly of the vascular capsule the lens was not normally formed; another in which the lens tho normally formed is absorbed as the result of vascular changes."

Treacher Collins accounts for some of the lenticular changes with the theory—"the lens is very large in proportion to other parts of the globe in fetal life, and is surrounded by a vascular membrane—the membrana vasculosa lentis. The anterior part of this vascular membrane remains until the lens recedes from the cornea, when it degenerates. If from any reason this vascular coat degenerates before the recession, the lens lies in contact

with the cornea for some time; degeneration of the anterior capsule and possibly of the lens may result." Hess has shown that in an embryo chick there had been some impediment to the separation of the lens from the corneal epiblast, retarding the closure of the anterior capsule, and he discovered corneal epithelium within the lens capsule in this case. His deduction was that separation might come later with destruction of lens substance. However, in such a condition epithelial cells would be found within the lens, and Dr. Gamble reports

Fig. 1. Cross section of membranous cataract (Findlay's case). Anterior surface above, posterior below. C anterior lens capsule. C E capsular epithielum. F lens fibers. N nuclei of lens fibers. P iris pigment. P C posterior lens capsule. V blood vessel.

entire absence of epithelial cells in the anterior pole of the specimen he examined.

In the case to be reported there is evidence that a low grade iritis had been present at some time. It is evident that we have here a rudimentary lens due to vascular disease, which evidently affected the membrana vasculosa lentis in the early stage and later, the vascular structure of the iris. The condition involved both eyes symetrically and no other malformations was found in either eye.

Case of R. C. The baby was brought to me at the age of two months. The parents had noticed white areas in both pupils when he was a few weeks old. The pupils were round and from 3-4 mm. in diameter; a central disc occupying the pupil was seen in each eye, with a small nipple elevation on each of these disc like opacities. Family history was negative, and the baby was well developed; no other abnormalities could be found.

When the child was a year old atropin was instilled and the pupils dilated only a small degree. A needling was performed in the right eye, and the whole mass moved readily with the knife needle, tho the iris was adherent all the way round it. Later a second attempt was made to break up the mass, and it was torn from the iris at the lower part, leaving a clear pupil at the lower half. No inflammatory reaction followed either operation.

On the left eye a small knife needle was introduced and a similar condition was found. Later on it was decided to make a keratome incision and remove the mass entirely. By means of an iris hook the lens mass was drawn out thru the incision, and it readily tore away from the iritic adhesions. Very little inflammatory reaction followed and the healing was uneventful.

On this eye now the pupil dilates to the maximum with a mydriatic. No fundus change can be seen, and no vestige of the hyaloid artery can be found. A lateral nystagmus is present in both eyes, and there is concomitant convergent strabismus. The child is too young to ascertain the acuity of vision, but there is no doubt of good qualitative vision. The lens mass was examined by Dr. Richard C. Gamble, who submitted the following report:

Left lens fixed in Zenkers. The specimen is a firm white disc, measuring 3 mm. in diameter and ½ mm. in thickness. On one surface there is a nipple like projection about 1 mm. in diameter, ½ mm. in height.

Microscopic. Cross section shows this tissue to be a lens which is very flattened. The lens fibers are shrunken and are straight, except in the region of the equator, where they are curved. There are many rows of lens fiber nuclei in the equatorial region, and less thruout the entire section. On the whole the number of nuclei

are greater than normal. The nipple like projection is from the anterior surface. It is composed of lens fibers and is covered by lens capsules. The lens capsule is wrinkled in many places; it covers about two-thirds of the specimen, and is absent over the other third. There is some black pigment on the anterior capsule as from a posterior iritic adhesion. In the region of the posterior pole, but in among the lens fibers, there is an oblique tube with an indefinite wall filled with brown granules. It has somewhat the appearance of a blood vessel filled with degenerated erythrocytes.

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NEWER OPERATIVE PROCEDURES IN THE TREATMENT OF GLAUCOMA.

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This is a systematic description of these operations with a comparative analysis of the several factors affecting each. It is doubtful if any one operation is applicable to all cases.
Read before the Chicago Ophthalmological Society, April 21, 1924. See p. 246.

Since our knowledge of the pathogenesis of glaucoma has not yet attained that degree of scientific accuracy which would direct our attention to the institution of prophylactic measures, our operative treatment is still confined entirely to the relief of that most destructive feature hypertension, and its train of distressing complications, rather than to the glaucoma *per se*.

In spite of the extensive research and investigation of the past few years, even the underlying causes of the increase of intraocular tension are still shrouded in obscurity; and hence, having no available means of preventing it, our treatment aims merely at promoting the outflow, either by reestablishment of the normal channels or the formation of a vicarious passage. For this purpose three principal routes are available:

1. Thru the openings in the pectinate ligament into the canal of Schlemm.
2. By a new formed tract connecting the anterior chamber with the suprachoroidal space.
3. By an opening thru the sclera connecting the aqueous chamber with the subconjunctival space.

Elimination thru the sinus angle presupposes the possibility of the restoration of excretion along the crypts of the iris thru the spaces of Fontana and Schlemm's canal unobstructed either by debris or peripheral adhesions. Such a restoration is possible only in the acute stages of congestive glaucoma and in those cases of simple glaucoma in which the iris has not become firmly attached.

It is the consensus of opinion that iridectomy is the operation of choice in the acute congestive stage, and this is confirmed by even so ardent an exponent of sclerectomy as Lagrange.

Operation should be advised and undertaken as early as possible, and in the light of the newer findings of Levinsohn and Koeppe, should these prove positively pathognomonic of glaucoma, operation should be performed even in the prodromal stage, to ward off the acute attack with its resultant impairment of the function of the eye.

Even surgeons who prefer filtering operations in all types of the disease stress the importance of complete iridectomy in the acute congestive cases, as any and all methods of operation frequently set up a low grade iritis, and complete iridectomy eliminates the only objection to the use of atropin, our most valuable aid in combating this condition.

The original technic of Beer, with only slight modifications, is still the preferred procedure for iridectomy altho two new operations, those of Török and Reese, give promise of gaining favor.

Török's operation is a true iridectomy

and depends for its effect on the restoration of the normal channels of excretion. He makes his incision with the Graefe knife, passing thru the iris angle and terminating in a conjunctival flap. Grasping this flap with a forceps, he causes a gaping of the wound by downward traction. He then passes an iris spatula between the iris and cornea in an effort to release any adhesions as far back as the iris angle. On occasion he goes even farther and establishes communication with the suprachoroidal space (a sort of reverse cyclodialysis). The iris is grasped with the iris forceps, not transversely as in Beer's operation, but vertically, with one blade at the pupillary margin and the other near the root. Thus traction is made meridionally and the iridectomy is completed with two cuts of the scissors.

Theoretically, the procedure possesses distinct features of advantage but it would seem that the technic is fraught with danger. No histologic examinations have been reported to substantiate the contention that the iris angle has been restored and normal drainage reestablished thru the spaces of Fontana.

Reese reports 237 operations on 65 congestive and 172 noncongestive glaucomatous eyes in which he was able to "relieve the tension and restore all vision that had not been destroyed by pressure atrophy, in every case of congestive glaucoma operated." In 25 noncongestive cases, two, and in 11 cases three operations were performed, before tension was relieved; while in five cases tension remained above 37, four of the patients refusing further operation while the fifth had three iridectomies and a trephine without reducing the tension.

The technic of Reese's operation comprises a careful preparation and thoro anesthesia. The inferior rectus is grasped with a catch-forceps and the patient instructed to look down. The incision is made with a special broad keratome bent at an angle of 21°, the point engaging the conjunctiva 7 mm. above the limbus and passing forward and downward under the conjunctiva to a point 2 mm. above the corneal margin, where it penetrates the sclera, entering the anterior chamber in the iris angle. An incision 8 mm. wide is made in the sclera, "thereby cutting the insertion of the pectinate ligament from the scleral spur and opening Schlemm's canal for the entire length of the incision." The conjunctival wound is then extended upward and backward by a scissors cut from each end, thus facilitating the retraction of the flap downward over the scleral opening. The conjunctiva is held down with a pledget of cotton and a broad iridectomy made. The pillars are replaced and the conjunctiva stroked back but not sutured.

In the noncongestive cases he serrates the anterior lip of the wound by punching out small pieces of sclera or trims off a piece with the scissors. Atropin is used the following day and massage is done daily for two weeks. It will be noted that in all cases Reese produces a filtering wound, either by massage in the congestive cases or by sclerectomy in the noncongestive types.

Those surgeons, chiefly of the German school, who favor iridectomy in all types and stages of glaucoma, frequently find it necessary to resort to some one of the filtering operations as a secondary procedure, as viz., the very interesting statistics of Uhthoff recently reported. "Of the different methods of operation the author uses only the following: iridectomy, sclerectomy, Elliot's trephine, Heine's cyclodialysis, and in a few cases scleroiridectomy. He almost always chooses iridectomy as the first operation and performs the others only if this is unsuccessful. Of over 1,000 cases of glaucoma 25% were acute inflammatory, of which 95.6% were operated upon with good results, (88.6% by a single operation); 60% were chronic inflammatory cases, of which 80% were operated on with permanently good results, (68% by one operation); 10.5% were glaucoma fere simplex, of which 79.3% were operated upon successfully, (58.3% with one operation); 7.1% were glaucoma simplex of which 75% were successfully operated, (44% with one operation)."

The very high percentage of successes in the acute congestive cases, 88.6%, with one operation, would seem to add great weight to the preponderance of opinion favoring iridectomy in this stage. On the other hand the very low percentage, 44%, of successes with one operation in the cases of glaucoma simplex

would lead one to feel that we are not justified in adopting an operative procedure which is foredoomed to failure in more than half of these desperate cases, where the time element is so great a factor and the eye is subjected to a needless operation which can only tend to complicate the secondary procedure.

In the operative treatment of the chronic congestive and noncongestive types of glaucoma a number of newer methods demand attention. All of these aim at the production of a filtering cicatrix or, as seems now to be conclusively demonstrated, a fistulous tract.

Even von Graefe recognized the desirability of filtration when he observed that a "sufficiently marked filtration" could be seen after iridectomy in one case out of every five; but it was de Wecker who first made a filtering cicatrix the definite object of his surgical procedure. His sclerotomy operation is familiar to all. Suffice it to say that it frequently fails of the desired result.

Heine's cyclodialysis was enthusiastically received, but statistics have proven, and histologic examinations have conclusively demonstrated, that the results are not permanent. Nevertheless, the operation still has a considerable field of usefulness, as a temporary measure.

The evolution of Holth's operative work in the treatment of glaucoma forms an intensely interesting chapter in the history of glaucoma surgery, and the fact that his latest procedure is the product of an evolutionary process which has involved the study and use of nearly all the various steps of all other methods, makes a strong argument in favor of his newest operation. It is for this reason, too, that so many different procedures have come to be designated Holth's operation.

Under the name of iridencleisis, Holth introduced a procedure in which he first penetrated the conjunctiva with a keratome at a point 8 mm. above the limbus; passing forward under the conjunctiva, he made a scleral incision 6 mm. wide 1 mm. above the corneal border. Retracting the conjunctiva with a double hook he withdrew the iris and made a meridional incision from the pupillary border to the root. He then allowed the iris to return to the anterior chamber with the result that two small knuckles of iris tissue remained incarcerated in the extremities of the wound. He reported a series of 87 cases with 86% of filtering cicatrices. He still believes this operation is a valuable addition to our operative procedures in the treatment of glaucoma, but feeling the desirability of a more certain method of producing a fistulous connection, he later devised his extralimbal tangential sclerectomy which will be described under the head of sclerectomies.

Following Holth's work with iris incarceration Borthen advanced a modified technic which he called iridotasis and reported 50 cases of simple and absolute glaucoma operated by this method without a single failure.

The name iridotasis implying iris traction was used to denote that the result in his opinion was due to the reopening of the spaces of Fontana in the lower semicircle because of the traction on the iris. This contention Holth holds to be fallacious.

Borthen makes his conjunctival opening by picking up the membrane about 10 mm. above the limbus with forceps and cutting thru and tunneling down to the corneal margin with scissors. With the conjunctiva retracted a keratome incision 4 mm. wide is made in the sclera 1 mm. above the corneal margin with a special instrument provided with a stop shoulder. In withdrawing the keratome the point is tilted toward the cornea to prevent injury to the lens. Thru this wound the iris is seized near the pupillary margin and drawn into the wound, thus inverting it so that its posterior pigmentary layer is left in contact with subconjunctival tissue and the sphincter is engaged in the wound. The conjunctival flap is replaced without suture.

Four very essential points of this procedure are to be emphasized:

1. The subconjunctival separation should be narrow.

2. The point of the keratome should be directed forward on withdrawal to avoid injury to the lens.

3. The iris must be grasped near the pupillary margin and inverted,

thus aiding the formation of a fistula, lined by pigment epithelium.

4. The iris must not be drawn out so far as to displace the pupil more than necessary.

In contradistinction to the foregoing operations are the sclerectomies, which aim at the production of an iris free fistula by a definite removal of a part of the scleral covering of the eye.

Lagrange in 1905 described an operation the technic of which he has not modified, and still stoutly maintains is the only correct procedure for sclerectomy. He does not recommend the operation to be used for acute glaucoma.

The incision is made with a Graefe knife which is inserted 1 mm. outside the corneal margin, with counter puncture in a corresponding position on the opposite side, about 4 mm. above the horizontal plane. The blade is advanced upward parallel to the iris and as close to it as possible, the object being to sever the scleral insertion of the ciliary muscle. At the highest point of the iris angle the edge of the knife is turned slightly backward so that it emerges from the sclera 2 or 3 mm. above the limbus and the incision is completed with a large conjunctival flap.

The flap having been everted, a piece of the anterior lip of the sclera about 1 by 3 mm. is cut away with a scissors. He advises that the size of the sclerectomy be inversely proportional to the tension. If the tension is less than plus 1 he omits iridectomy, if from plus 1 to plus 3 he does either peripheral or complete iridectomy, the latter in case the iris has prolapsed. The wound is freed from all iris tissue and the conjunctival flap replaced without suture.

Elliott's sclerocorneal trephining has attracted wide attention and has been extensively used in the chronic congestive stage of glaucoma, and in glaucoma simplex. The technic has been modified from time to time with good effect. He advises making the operation in the upper quadrant when possible because: 1. the wound is less exposed to infection; 2. the iridectomy lies under the upper lid; 3. the conjunctiva overlaps the cornea for a greater distance above, thus allowing more space for the trephine.

The flap is made large but is not undermined thruout its whole breadth. Special stress is laid on the importance of making as thick a conjunctival flap as possible, more especially as the limbus is approached, this to insure a thick conjunctival covering for the trephine hole. The cornea is then split to a depth of about 1 mm. and thus the 2 mm. trephine, which he recommends, makes an incision, half in the sclera and half in the cornea. Elliott lays great stress on the importance of having the trephine hole as far forward as possible. He says, "a failure to observe this rule (1) makes a clear entry into the chamber uncertain; (2) complicates the free tapping of the aqueous fluid; (3) leads later on in some cases to an interference with filtration, due to uveal tissue blocking the trephine hole; and, (4) exposes the eye to the danger of vitreous escape. An iridectomy should be made as a routine step in every trephining operation simply to avoid the risk of iris tissue becoming impacted in the trephine opening, during convalescence." He advises a peripheral iridectomy only, and to secure this, as soon as the iris bulges into the trephine hole lifting the disc, he grasps both together with the iris forceps and cuts them with one snip of the scissors. In this way he avoids undue traction on the iris and uvea tissue, and all risk of the latter becoming impacted in the aperture. The conjunctival flap is then replaced and sutured.

In 1921 Holth brought forward his extralimbal tangential sclerectomy and a few months later modified his technic by abandoning the large flap of Elliott and returning to the narrow subconjunctival tract he had used previously in his iridencleisis. His conjunctival incision made with a keratome, begins about 8 mm. above the corneal margin but about 30° to the temporal side of the median line. Passing downward under the conjunctiva, the scleral wound about 3 or 4 mm. long is made just temporally to the median line, about 2 mm. above the limbus and parallel with it. In his own words, "The 1 mm. wide blade of the

punch forceps is with the flat part parallel with the sclera in a tangential direction, introduced below the nasal angle of the wound 3 mm. into the anterior chamber. In order to make the scleral opening oblique and so place it further from the limbus the handle is lowered till it forms an angle of 150° with the plane of the iris."

The piece of sclera is then excised by closing the forceps. It should be 3 mm. long and 1 mm. wide and the anterior edge should be placed rather more than 1 mm. from the limbus. A small basal iridectomy is done except in the cases where the iris has prolapsed, in which a complete iridectomy is advised.

Curran working upon a new theory as to the cause of hypertension performs a peripheral iridectomy or preferably an iridotomy. He contends that the cause of the hypertension is a too close application of the lens to the posterior surface of the iris thus causing an interference with the free flow of aqueous from the posterior to the anterior chamber. The technic consists in introducing a knife needle into the anterior chamber at the corneoscleral margin and passing it thru the iris. Gifford, who has used the procedure rather extensively, feels that there is a very definite field of usefulness for the operation, but in his last report states that practically all cases require continued exhibition of miotics to keep the tension down. Elschnig reports sixteen operations, in nine of which he was able to reduce the tension, some permanently. He states that the operation may be used palliatively in advanced glaucoma, especially in defects of the visual field reaching close to the center and when miotics fail.

I shall attempt a comparative analysis, not of the operations as a whole, but of the different steps as pertains to the anatomic structures dealt with.

(1) The conjunctival covering.

The ideal subconjunctival filtration area is a broad flat cushion. Normally this space can be infiltrated readily. When, however, adhesions form between sclera and conjunctiva this process is seriously interfered with. In view of this fact it will be seen that any extensive separation would tend to limit the distribution of the aqueous into the subconjunctival space by the formation of scar tissue, and thus produce a vesicle.

Seidel has shown, by staining, that small openings appear on the surface of these blebs, indicating a direct communication with the interior of the eye, with the resultant danger of infection. Elschnig, however, attributes the relative frequency of late infection following trephining, not to the thinness of the conjunctival covering, but to the absence of an adequate vascular supply in the trophically injured conjunctiva. It would seem then that a narrow subconjunctival tunnel would be a safer and more effectual procedure in this step of the operation.

(2) The sclerectomy.

Since the available space from which a piece of sclera can be excised without interference with the ciliary body is limited to about 1 mm., Elliot found it necessary to carry his trephine hole up into the cornea, as an opening smaller than 2 mm. too frequently became plugged, and thus defeated the object of the operation. Lagrange and Holth, in order to secure adequate drainage make the opening 1 by 3 mm.; but this procedure materially weakens the ocular wall as compared to the round trephine hole.

It is just here that iris inclusion operations find their greatest advantage, for in these cases the formation of a fistulous tract does not depend upon the removal of scleral tissue, and that such a tract is produced has been sufficiently attested by fairly extensive reports of successful clinical results but more especially by the histologic findings in eyes enucleated some time after the operation for some other cause.

(3) The iridectomy.

The advantages of complete iridectomy are: First that in those cases in which no peripheral synechiae are present, or in which they can be freed by Török's procedure, it makes a free opening to the spaces of Fontana, and second it severs the sphincter and thus removes the only objection to the use of atropin.

The peripheral iridectomy on the

other hand is preferable in the cases in which only external drainage avails. It furnishes free passage for the aqueous, leaves the iris sphincter intact for the further exhibition of miotics, and avoids the dazzling and blurring of vision so common after complete iridectomy.

It is here that we find the greatest weakness of iridotasis. If the contention of Borthen is correct, this traction on the iris must result in drawing up of the pupil which with the coloboma diminishes visual acuity and causes dazzling.

The contention that the incarceration of the iris in a scleral wound is fraught with grave danger would seem to be a chimera, as evidenced by the increasing volume of favorable reports of iridotasis.

The fistulization glaucoma operations fall naturally into two classes, those in which iris incarceration is considered essential to the production of a fistula, or at least a filtering cicatrix, and those in which an iris free opening is the object of the operation.

Following the observations of de-Wecker who first used the term "filtering cicatrix" several of the later writers maintain that iris incarceration is essential to the production of this condition.

Holth, basing his opinion on histologic examinations, for a time was an ardent supporter of the iris incarceration theory, but the technic of his latest operation would lead one to believe that he had abandoned iris incarceration in favor of an iris free scleral aperture.

Lagrange and Elliot stoutly maintain that an iris free opening is most desirable.

The contention is made by Herbert that filtration in contradistinction to fistulization, obtains as the end result in his procedure. The anatomic specimens presented, however, seem to show that the former condition does not occur, but that drainage is always thru a fistula.

Until very recently few microscopic findings have been reported on the results of sclerectomies.

Verhoeff in 1916 reported a case of iridotasis. Tension recurred and the eye was enucleated. The iris was found firmly adherent to the sclera forming a vesicle. He believes that the contraction of the sphincter drew the iris margin in until the pupillary border came in contact with the anterior lip of the wound and adhered. He also reports a case about two months after a trephine operation in which he found a filtering scar.

Fuchs describes two specimens in which trephine had been performed both of which showed that uveal tissue had prolapsed into the opening.

Holth reported a very interesting series of six cases illustrated by microphotographs which are worthy of careful study. All the specimens were obtained after the death of the patients. Four of the cases were iridencleisis operations with incarceration of the iris. Three were examined about five years, and one five months after operation. In all these cases the fistulae show a distinct lining of pigment epithelium. The fifth was a trephine and the sixth a limbal sclerectomy, a piece of the anterior lip of the wound having been resected with the Holth forceps. Both showed fistulous scars without iris incarceration.

The anatomic specimens presented in a very recent article by Elliot, together with the above reports by Verhoeff and Holth lead Elliot to conclude that iris impaction is not essential to fistulization but that this procedure introduces an unnecessary element of risk of iridocyclitic complications.

Further work in this most important field of histologic examination will no doubt be a large factor in determining the best type of operative procedure for each of the several stages and types of glaucoma, for it is doubtful if any one operation will ever prove universally applicable.

To SUMMARIZE: Several factors enter into the decision as to the best operation in any given case of glaucoma. viz.:

1. The stage or type of glaucoma with which we are to deal.

2. The end result to be expected, not merely the immediate result but the permanent lasting relief of the symptoms.

3. The risk entailed of setting up complications as by insult to the delicate uveal structures, by affording access to bacteria thru opening of the globe, by injury to the lens, by determining intraocular hemorrhage, by hypotension with resultant choroidal detachment and wrinkling of the cornea, by leakage of aqueous, and by failure of the anterior chamber to reform.

4. The difficulty of the technic.

5. The after effects of the procedure such as the determination of refractive complications, displacement of the pupil and dazzling.

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NOTES, CASES, INSTRUMENTS

CYCLOPLEGIA FROM ACUTE ETHMOIDITIS.

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MEMPHIS, TENN.

On Sept. 23, 1924, I received a call to come to the hospital without delay, to see Mrs. W. L. (a nurse) "suffering with a possible attack of acute glaucoma." She gave a history of a bad head cold for three weeks, and pain in both eyes for several days. The pain had increased that afternoon, distant vision became blurred, and she was unable to read at all.

Examination showed no inflammation of eyes or even a conjunctival congestion. The pupils were widely and regularly dilated with a complete absence of pupillary reflexes. Tension was normal in each eye by palpation. Intraocular examination showed all media clear, and eye grounds normal. Palliative measures were prescribed, and the patient ordered to report for treatment next day.

Sept. 24. V. both eyes =20/50. Fields normal for form and color. Blind spots normal. Pupils fully dilated, and reflexes absent. Examination of nose showed considerable swelling of the middle turbinates, and an acute bilateral ethmoiditis. After cleaning and shrinking the nasal chambers, negative pressure was used, and a large amount of mucopus withdrawn.

Sept. 25. No pain in eyes or head, pupils not so widely dilated, but still inactive. V. O. U.=20/20-2.

Sept. 26. Pupils almost normal in size, and react sluggishly to light. V. O. U.=20/20. Reading = Jaeger 5 at 20 inches.

Sept. 29. V., normal, for both distance and reading. Pupils normal in size and reaction. Refraction under homatropin shows 1. D. of hyperopia in each eye. No heterophoria present.

No eye treatment was employed in this case, but her nose and nasal sinuses were treated daily for a week. It is not unusual to see ciliary spasm associated with acute nasal sinusitis, but cycloplegia, I believe, is exceedingly rare.

DYSTROPHY OF THE CORNEA.

H. L. Hilgartner, M. D.

AUSTIN, TEXAS.

This case came under my observation on October 26th, 1924, in a consultation invited by Dr. S. C. Applewhite, San Antonio, Texas.

History: Mr. N., aged fifty-five, had suffered for several years and had been treated for parenchymatous keratitis. The condition had fluctuated during these years. The X-ray examination showed sinuses negative, and some teeth needing removal on account of pyorrhea. The general physical examination also gave negative answer.

Examination of the cornea revealed circumcorneal engorgement of blood vessels. Centrally the cornea showed disappearance of the upper epithelial cells with the deeper portions clear, this area being about one-quarter inch in diameter. Surrounding this desquamated central area there was a swollen condition, caused by infiltration between underlying layers, the resulting blebs making the surface very uneven. At the "two-o'clock" point of the cornea a narrow elliptical hemorrhagic infiltration lay radially from the periphery toward the center. The cornea was insensitive to touch. The bulbar conjunctiva was mildly congested. The anterior chamber was very deep. The tension of the eyeball to finger palpation was strongly plus. No inflammatory involvement of the interior eyeball could be discerned. Vision had been reduced to counting fingers at two feet.

The differential diagnosis between the condition before us and glaucomatous corneal haze, interstitial keratitis, or other forms of corneal opacity, seemed to be decisive and we diagnosed the case as dystrophy of the cornea—the rare degenerative affection of the cornea first described by Fuchs in 1910.

According to Dr. Lloyd B. Whitham, of Baltimore, in the American Journal of Ophthalmology, October 1924, only nineteen cases of dystrophy of the cornea have been reported.

I have not yet had an opportunity to study this case with my Gullstrand Slit Lamp, but I am in hopes that the patient will give me an opportunity to do so.

A NEW DROPPER BOTTLE.

Conrad Berens, M.D., F. A. C. S.

NEW YORK CITY.

The dropper bottle to be described is a container and dropper combined.

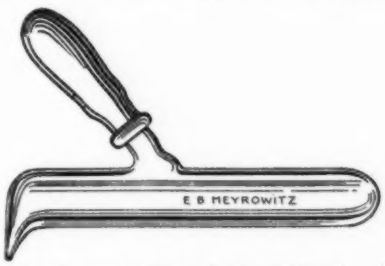

Fig. 1. A new dropper bottle (Berens). Above rubber bulb for expelling contents. Below bottle and beak thru which drop is expelled.

It is composed of a cylindrical container 9 centimeters in length and 13 mm. in diameter, drawn out at one end to a dropper tip at an angle of 45° to

the container. An opening in the cylinder is made on the side opposite the dropper tip at the junction of the upper and middle thirds, into which a half inch glass tube is fused at an angle of 45° to the container.

Method of Using the Dropper. The tip of the index finger is applied to the rubber nipple and the thumb and forefinger grasp the cylinder.

The container is tilted until the solution fills the tip of the dropper; gentle pressure is then applied to the nipple and the drop, drops, or stream of fluid are forced out.

Advantages. 1. The medicine dropper and container are combined.

2. The dropper can be held more firmly than the ordinary dropper and as there is no wobbling, the drop can be more accurately placed.

3. The container and nipple are easily sterilized, and the bottle can be refilled without resterilization, by removing the rubber nipple.

4. Solutions keep sterile longer than they do in the ordinary bottle, for when the cork is removed from an ordinary bottle, the dust around the mouth of the bottle drops in. It is also much more sterile and safer than a bottle with a glass stopper and dropper combined, for the dropper in this type of bottle is exposed to the air and possibly touches the patient's eye, eyelid or eyelashes, and is then put back in the bottle.

5. The device is economical of solutions for two reasons, first because they are seldom contaminated; second, because the dropper containing the solution is not thrown away if the patient's lids are touched; it is only necessary to express a drop and wipe the tip with alcohol.

6. If ordinary care is used, the solution will not get into the rubber nipple, thus lessening the possibility of contamination and the entrance of foreign particles into the eye.

Uses of the Dropper. 1. Keeping and applying solution in office and hospital practice. 2. Keeping and applying solution in the operating room. 3. Dispensing drops for the use of the patient at home.

The droppers may be obtained from E. B. Meyrowitz, 520 Fifth Ave., New York City.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly scientific papers and discussions, include date of the meeting and should be signed by the Reporter or Secretary. Complete papers should not be included in such reports; but should be promptly sent to the Editor as read before the Society.

MINNESOTA ACADEMY OF OPHTHALMOLOGY.

Meeting of December 12, 1924.

Dr. John S. Macnie, President.

Coloboma of the Macula.

Dr. J. A. Watson. Mrs. C. V. consulted me first on February 22, 1915, complaining of aching of the eyes and blurring of the vision on near work. I prescribed for her at that time:

R.+0.75S.⌒+0.75×60°;
L.+0.75S.⌒+0.75×80°.

The refraction of the right was, however, determined entirely by the use of the retinoscope, as her vision in that eye amounted only to the discerning of fingers at 10 ft. and was not improved by lenses. The eye really showed hyperopia of about three diopters. The vision in the left eye was and is normal.

Tho she was then 28 years old she had never been conscious of any deficiency of vision in the right eye, until I drew her attention to it. The opthalmoscope showed in the fundus of that eye, a circular white area in the macula nearly twice the diameter of the papilla. It had a faint bluish green tint. The edges were distinct and sharply defined. There was a good deal of pigment around the borders, especially around the lower and temporal borders. There were several whitish spots and a good deal of pigment in the surrounding fundus. There was

no ectasia of the macular patch. A number of small retinal vessels could be seen on its surface.

For a time I considered the possibility of this area being a hole in the macula; it was, however, entirely devoid of pigment and of choroidal vessels. Furthermore, there was no history of injury. It was evidently a coloboma of the macula.

I believe that only about fifty cases of this condition have been reported. It should, of course, be distinguished from extrapapillary colobomata where the macula is free. This case is an unusual one in that the coloboma is almost absolutely circular. Much more commonly it is oval or horizontal. In this case also the coloboma is smaller than usual. They are usually about three times the diameter of the disc. The horizontal diameter sometimes attains 10 disc diameters.

Discussion. Dr. John A. Fulton asked Dr. Watson about the family history, as to whether or not there were other members of the family similarly affected. Dr. Watson stated that there was absolutely nothing in the family history to throw any light on the case.

Dr. John Brown stated that he had seen this interesting case with Dr. Watson. He did not think he had ever seen one like it. Several things occurred to him that gave the impression that it was in the choroid, more like a hole in the macula. The fact that there is a difference in the translucency or tint of this spot, the position of it, and the relation of the blood vessels there, made him believe that this is, as Dr. Watson stated, a congenital affair and probably a coloboma of the choroid and retina at the macula.

Dr. Watson stated that he had nothing to add, except that this condition is certainly not the result of any inflammatory lesion. It is almost inconceivable that any inflammatory lesion could produce an almost perfectly round and clearly defined circle. It does resemble a few of the cases of hole in the macula. When he first saw this case he had just read a report, describing a somewhat similar condition and calling it hole in the macula. He thought, however, that hole in the macula always exhibits some at least of the choroidal vessels, is never pearly white with a greenish or bluish tint, and never perfectly circular with such a clearly defined edge.

Keratitis Following Smallpox.

Dr. E. S. Strout presented R. J. K., age 25 years, taken ill with smallpox about Oct. 15th. First seen on account of eye complication, on Nov. 10, 1924, when he had just been released from quarantine. This patient had never been vacccinated and had suffered from a severe type of confluent smallpox. During the third week of the attack he began to experience a feeling of irritation in both eyes, more especially in the right. The eyes were sensitive to light, lacrimation very pronounced in the right, and he gave a history of being sensitive to light all thru the course of the disease.

Examination of the left eye at this time showed a small marginal ulcer of the cornea, nasal side. There was moderate pericorneal injection, but very little disturbance of vision. In the right eye there was a small scar at the nasal limbus corresponding in situation to the ulcer in the left eye, which was taken to be the result of an earlier ulcer in this eye. Extending into the cornea from the nasal side, there was an area of infiltration circular in shape and very much resembling a disciform keratitis except that it was not centrally located. The cornea did not stain. Beyond this circular area there was a less definite infiltration involving the pupillary area. About a week later this gradually developed into a second disc, underlying the first but extending some two millimeters further toward the temporal side.

The entire opacity seems to be gradually moving across the cornea, and at present there is quite a strip of clear cornea on the nasal side which formerly was entirely covered by the deposit. The infiltration appears to be gradually becoming thinner and is much less dense on the temporal side than it was ten days ago. The eye still remains very sensitive to light and lacrimation is pronounced; at times the patient experiences considerable discomfort and some actual pain in the eye.

Discussion. Dr. Douglas Wood said that in looking over the reports of the last ten years, in the State Blind School of Faribault, blindness from smallpox occurred in from 3% to 7%. Before that, it used to run from 30% to 35%. Fuchs says, in Germany before vaccination was compulsory, the per cent ran about 35, and about the same in France. Now it runs better than 2% and 3% here as well as abroad. Vaccination is stopping this form of blindness. In the Minneapolis sight saving classes, among 13 blind cases, there are only two blind from smallpox.

Dr. Wood said he does not understand why smallpox does not affect the eye more often than it does. Most of the eye trouble occurs in smallpox because the physician does not take proper care of the eye, as he should. The conjunctiva should be cleaned and cared for every day by irrigation, etc. He had seen a case two weeks ago, where the child was having ulceration of the conjunctiva for several days before his eyes had been treated. Most of the ulceration in the conjunctiva is at the edge of the tarsus, or the edge of the lid. Where the ulceration is near the cornea there is a purulent or sclerosing keratitis. Ulcerations of the cornea are like serpiginous ulcers. He saw a case several years ago, of a woman who had ulcers of both corneas. These corneas seemed to melt away in a few days.

One interesting thing about these smallpox infections of the eyes is, that they often come on in the later stages of the disease; sometimes after the patient is up and around. During a very severe epidemic in the Montreal General Hospital, he recalled that about the only treatment they were able to give was irrigation and cauterization. Of course that generally resulted in a blind eye, or a cornea covered with scar tissue. The ulcers are often taken for serpiginous ulcers but they are not a pneumococcus infection. He had, lately, a case of ulcers of the lids and also one of ulcers of the alae of the nose, following vaccination.

Dr. Strout asked for suggestions in regard to treatment of this case. He said they are using atropin and heat, also dionin and 1% yellow oxid of mercury ointment. He said that in discussing this case with his associates, it was the consensus of opinion that they were dealing with a trophic disturbance; and on Dr. Macnie's suggestion he has been getting increasing doses of strychnia hypodermically on alternate days, the last dose being one-eighth grain. The two interesting phases of this case are: 1st, that it is not an ulcerative process as most corneal lesions complicating smallpox are; and 2nd, the migratory character of the infiltration. When first seen, the opacity began at the nasal limbus, but it has gradually moved toward the temporal side until now there is a clear strip of cornea, perhaps two millimeters in width, intervening between the limbus and the lesion.

Dr. John Brown stated, in answer to Dr. Strout's inquiry for additional therapy, that he had never had but two of these ulcers following smallpox. He went on the same supposition that Dr. Strout did, but gave them Fowler's solution and both the cases did very well. One woman he had seen in a former epidemic and he saw her during this present epidemic. He took the vision and she had 20/25 vision in the eye that had had the ulceration. He believed she had 20/50 vision when he saw her previously. It has a tendency to get better.

Keratouveitis.

Dr. Wm. W. Lewis presented this case for diagnosis. This man was first seen in August, his eye at that time having been inflamed about one week. The picture was that of a typical catarrhal ulcer, extending in the chararteristic groove like ulceration inside the limbus in the upper nasal quadrant. It seemed when he first saw it, that it would be but a matter of a few applications of silver nitrate, applied to the everted lids, and that that would be the end of it. But it has persisted all these months, resisting all kinds of treatment, locally and constitutionally. There has persisted almost from the beginning, namely, an iridocyclitis with seclusion of the pupil, and at this time the entire cornea seems to be becoming infiltrated. Wassermann test negative and bacteriologic smears failed to give any information as to the cause.

Consultation, as yet, failed to label the condition satisfactorily. Lately it has been agreed by all that the only thing left to do is to enucleate the eye. The last resort for relief that was attempted was a large Kuhnt's flap, which partially covered the ulceration above, but the ulcer still extended down the nasal side.

(Later: A spore bearing saprophyte, was reported from laboratory of Miller Hospital.)

Discussion. Dr. R. O. Leavenworth stated that Dr. Lewis had used silver nitrate, mercurochrome and cautery with phenol and iodin. Dr. Lewis had also given the patient two milk injections and covered the ulcer with a Kuhnt's flap. Any additional treatment would certainly be worth trying.

Dr. W. E. Patterson would like to suggest, in any inflammatory condition in the eye where the uveal tract is involved, trying intravenous injections of sodium salicylate in 15 to 20 gr. doses. His experience with it has been very gratifying and he has lately used it almost entirely where formerly he had made use of the foreign proteids.

Exudative Lens Opacities.

Dr. Elwyn R. Bray. Mr. E. J. E., age 41, printer. General health has always been good. Came to me November 7, 1924, complaining of dimness of vision of left eye, which he had noticed for one week. There was no pain and the eye was not much inflamed, so he had let it go without treatment, thinking it would clear up. He has a slight conjunctivitis, which has been present at times for many years. The pupils reacted readily to light and accommodation. Cornea was clear. Ophthalmoscopic examination with +4 lens showed a stippling of the posterior surface of lens, having the appearance of very thin scum. The fundus could be made out thru this fairly well. His vision at that time was 20/15 for the right eye, and 20/50 for the left. There seemed to be no iritis present.

Urine examination was negative. Wassermann examination was made and found negative. X-ray of teeth showed one bad tooth, which was removed. Sinuses clear.

Under the use of dionin and heat, the vision of the left eye cleared to 20/30 by the aid of glasses, but improvement seemed to stop there for two weeks.

Dr. Fulton saw the case as to the advisability of using milk injection. Dr. Fulton thought it would be a wise procedure, and 4 cc. of milk, which had been boiled for four minutes, was given to him intramuscularly on the 4th of December. He had a marked reaction, chills, and weakness. The weakness lasted several days, but the second day after the milk injection was given the vision improved very markedly so that his vision with glasses was 20/15.

Examination by use of the ophthalmoscope with +4 lens showed only a slight stippling still remaining at the periphery of the lens, the central haziness having almost entirely cleared.

It is possible that this improvement would have come in time without the injection of milk, but coming on so soon after the milk injection would lead us to believe that this treatment should deserve at least some of the credit for the marked improvement.

Discussion. Dr. John Fulton said this patient was under his care several years ago suffering with one of the most irritable conjunctiva and retina that he had ever been called upon to treat. He attempted to relieve this by a surgical procedure, correcting a well pronounced hetrophoria which he had found. The result was not altogether satisfactory as the symptoms were only partially relieved.

In regard to the condition which Dr. Bray found, Dr. Fulton said he was able to confirm the diagnosis. The satisfactory relief obtained by the intramuscular injection of boiled milk indicates that foreign proteins, as therapeutic agents, for the relief of early stages of lens opacifications are well worth our most careful study, as this case demonstrates.

Dr. Bray said he looked upon this haziness on the posterior surface of the lens as due to a low grade inflammation which the patient's system was not quite able to overcome. The leucocytosis following the milk injection was sufficient to overcome this inflammation.

A Case of Glaucoma.

Dr. John S. Macnie presented Mrs. M. T., age 53 years 8 months. Well nourished and healthy, with no significant previous medical history, except that she has been under a severe mental strain and anxiety for some years. Prior to May 1922 she had had no trouble with her eyes, except a refractive error which was corrected with glasses. She had never had a mydriatic until May 1922, when she went to a general practitioner who practiced ophthalmology as a side issue, and she was given drops to put in her eyes every hour for one and one-half days except when sleeping; and, in addition, when in the doctor's office had drops every fifteen minutes for a considerable time. A day or two after this the left eye became red and painful and the patient was very ill with nausea, vomiting and pain in the head. The pain was alleviated by opiates. The patient was in bed ten days. Upon relief of the pain she noticed that the left eye was blind and it remained blind for two or three weeks. She gradually recovered some sight but never as good as before the drops were used. There was no further trouble with the eyes until the present condition.

She went to the same practitioner on Oct. 27th, 1924, for a reexamination, and was given drops to use in the same way at home and later at the physician's office every hour. After two days of use of the drops she began to have extreme pain in both eyes; this time the right eye was the worse. The patient was nauseated and vomited, and suffered extreme pain. She was in bed for ten days with extreme pain in the right eye and blind in both eyes, altho she did not realize that the left eye was blind at first because of the pain in the right eye.

I was called to visit her on November 11th. The right eye presented the picture of absolute glaucoma. Vision, R. E., perception of light to the temporal side. The L. E. was not as badly affected—the vision somewhat better. The tension in the R. E. was 90 and in the L. E. 65. Fundi invisible because of cloudy media.

The patient was hospitalized and energetic measures instituted to reduce tension. Pilocarpin and eserin were used and a leech applied to the temple of the right eye; elimination by bowel was instituted and light diet given. The next morning the pain in the right eye was reduced and patient stated that the vision was returning in the left eye.

On the 13th the tension in the right eye was reduced to 67 and in the left to 27. Vision continued to improve in the left; the right eye only p. l. to temporal side. On the 14th, the tension remaining up to between 65 and 70 in the right eye, it was considered advisable to operate. Because of the long duration of high tension, a very unfavorable prognosis was given for any recovery of sight.

Due to the extreme high tension and the sensitiveness of the right eye, the patient was prepared for general anesthetic with understanding that, if possible, the operation would be done under local. She was given ¼ grain morphin sulph. one hour before time set for operation. Five minims of 1% novocain was injected under the conjunctiva and several drops of 5% cocain dropped on the cornea. Four and one-half drops of 1:1000 adrenalin was injected in the lower cul de sac, according to the method suggested by Dr. Gradle in the November American Journal of Ophthalmology. The effect of this was almost immediate upon the eye. The congestion was reduced, the eye became white, and in a few minutes the tension taken by the tonometer had been reduced from 68 to 30. The pupil was already dilated from cocain so that caused by adrenalin was not observed.

Unfortunately, there was a reaction upon the patient's general condition—whether from the adrenalin, or the morphin or cocain used for local anesthetics, or combination of the three, I do not know, but she became pulseless, pale and bathed in perspiration. There was a partial recovery under stimulation so that the operation was undertaken with a local anesthetic.

A wide conjunctival flap was dissected down to the cornea, an incision with a keratome made and enlarged with tenotomy scissors and a wide iridectomy was made as soon as possible.

The patient s eye was bandaged and she was returned to bed and was soon in good condition.

There was an uneventful convalescence, the tension remaining down in the right eye to 35, and in the left eye 35 to 38, McLean tenometer. Patient was discharged from the hospital on the 26th of November. Much to my astonishment and gratification, the vision has gradually and steadily improved, until today, Dec. 11th, her vision is 6/9—1 in the right eye and 6/6 +2 in the left eye. The field in the right eye is reduced to less than 10%; in the left eye she has about one-half normal field. The left iris is atrophied, probably from the attack of glaucoma two years ago.

Ophthalmoscopic findings: The right eye shows a very deep physiologic excavation. The left eye shows considerable optic atrophy and a fairly well marked glaucomatous excavation.

It was considered worth while to report this case because of the apparent unescapable relation between the onset of an acute glaucoma and the instillation of a mydriatic, occurring in the same patient twice. Also the recovery of almost normal vision in an eye which seemed practically hopeless; and especially the very gratifying results in reduction of tension by the subconjuntival injection of four and one-half minims of adrenalin.

Discussion. Dr. J. A. Watson said that this case is very interesting, showing in the first place how much hope one can have for recovery in acute glaucoma even after the eye is almost totally blind and even after the condition has existed for a considerable time. One of the things that impressed him, Dr. Watson said, was the remarkable effect from the injection of the adrenalin. The adrenalin was injected with the patient on the table ready to be operated. The tension of the eye was so great that the doctor was afraid they could not get very good anesthesia. The effect was remarkable. The tension dropped within a very few minutes from 68 down to 30. Dr. Watson said he felt hopeful that the injection of adrenalin is going to be of considerable value in many cases of glaucoma, perhaps even in the chronic form.

Dr. Watson said he had at present a case of a woman who has had chronic simple glaucoma in both eyes for several years past. He did a combined iridectomy and sclerectomy on the right eye last year as it was getting worse in spite of miotics. He was afterwards obliged to enucleate the eye owing to iridocyclitis. The other eye had been getting steadily worse of late. When she came in a few weeks ago the tension was about 62. He gave her first of all an injection of 2 minims of adrenalin only, being a little afraid of its effect. There were, however, no unpleasant symptoms. The pupil was pin point when the injection was given. Patient was kept on the table for one-half hour and the pupil began to dilate. The tension was taken again before patient left the office and it was 48. In two days another 4 minims was given and the tension at once came down to 40. A third injection was given two days later. The tension did not fall any further but has remained about 40. She was complaining of subjective phenomena before the treatment, especially seeing wriggling masses of colored snakes. All this has disappeared. She is still, of course, under miotics.

Dr. Douglas Wood asked about the vitreous.

Dr. Watson stated that the media are clear. He had not, however, dilated the pupil sufficiently to get a clear view. Owing to the fact that the eye has been constantly under miotics the adrenalin dilated the pupil only slightly and temporarily.

Dr. Wood asked where the adrenalin is injected.

Dr. Watson stated that it was injected in the lower cul de sac.

Dr. Wood asked if there is any reaction.

Dr. Watson stated that he did not get any reaction in that case, but that is the only case in which he had used it.

Dr. John Fulton said if adrenalin reduced the tension so satisfactorily, why not continue the use of this remedy and not resort to operation.

Dr. Macnie said that Dr. Gradle advises that, and had he had a preknowledge of the technic he probably would not have done the operation

then but postponed it until a more favorable time. Dr. Macnie asked Dr. Watson what the vision is in the case he mentioned.

DR WATSON stated that it had been getting slowly worse. The central vision before the adrenalin treatment was about 20/50, and it is still about the same. The fields are rather markedly reduced.

Primary Optic Atrophy.

DR. J. A. PRATT, presented Mr. W. C. P., aged 33, who came Nov. 20, 1924, complaining of poor vision which necessitated his stopping work on Nov. 8, 1924. The patient looked well nourished, had a peculiar pasty complexion, said he did not drink, and denied infection. He said the army examined his blood a number of times, but it was always negative.

The vision of the right eye was finger motions; the vision of the left eye 15/70—1. The general appearance of the eyes was normal, with possibly a slight swinging out at times of the right eye. The action of the iris of the right eye was very sluggish, while the left was quite normal. The field of the right eye was nil, but the left showed an absolute nasal hemianopsia. The retinal examination showed the veins larger and the arteries smaller than normal. The right eye nerve was white, while the left eye showed the temporal side white, with the nasal side decidedly pink.

A tentative diagnosis of pressure atrophy was made and the patient sent for an X-ray and Wassermann. The Wassermann returned four plus and the X-ray showed loss of the posterior clinoid processes. We were now quite positive we had a gumma of the sella turcica region, and he was immediately placed on injections of neosalvarsan, with an improvement of the left eye, by Dec. 12th, from 15/70-1 to 15/30.

Dr. Goss was called in to see the case, and the X-ray he had taken showed the sella turcica practically normal. I then had the patient rerayed, and one picture showed the sella and the other did not. I asked Dr. Howard McI. Morton to examine the case and will read his comment and show his perimetric chart of the case.

"The accompanying chart of the visual fields of Mr. W. C. P. fairly well represents the extent and character of these fields. The right field is lost; the left field shows a sharply outlined nasal hemianopsia, the line of demarcation passing vertically thru the point of fixation. There is contraction of all the fields, both for form and color. But the color fields, especially the red, more nearly approaches normal than either the form field or green field. The green field is noticeably restricted in the oblique meridians. Careful testing reveals very little, if any, change in the blind spot.

The pupillary reactions of this man, when carefully studied do not reveal any marked or characteristic change, except that they are sluggish and there is a suspicion that the consensual reaction from left to right is less active than the reverse. As you well know, it is perfectly possible to have perfect pupillary reflexes in extreme optic atrophy, such as exists in this case; for the pupillary centrifugal fibers in the retina are a thing apart from the visual fibers, altho it is true, in cases of optic atrophy, pupillary deviation and the absence of the pupillary reflex is found. These preserved reflexes indicate, together with the escape of the centers of lower rank in the floor of the third ventricle, that the lesion is not there, for the interconnecting fibers between the Edinger-Westphal nuclei are intact; that is, the pupillary arc is not interrupted. The pupillary reflexes for convergence are also retained, but there are no socalled neighborhood symptoms that so often occur in diseases associated with the involvement of the sella turcica. There are also no general symptoms that might be expected if the lesions were in the region of the large ophthalmic nuclei, that is the optic thalmus, or the red nuclei, or in the pontine portion of the midbrain.

This man has absolutely no other symptoms but eye symptoms, and those symptoms are strictly of a visual character and not a motor-sensorial

character. The only part of the visual fibers not yet affected are those on the nasal side of the left optic tract. I believe if we had a lesion posterior to the third ventricle, we would have had some associated symptoms such as involvement from pressure of the 6th and 7th nerve, especially as the 7th winds around the 6th just below its nuclear origin, which might occur if this lesion were situated in the fourth ventricle. Binasal hemianopsia, which this case might have originally been, could hardly have been a bicortical accident. This would suppose exactly situated bicortical lesions, the one on the right and the other on the left.

It therefore seems to me probable that the lesion that causes this trouble is one immediately adjacent to the chiasm. It is a well known fact that all types of hemianopsias may arise from lesions here, owing to the peculiar disposition of the hypophyseal mass as it responds to pressure and growth. I am fully aware that the placing of this lesion is in the realm of uncertainty. However, the pictures you showed me certainly do not prove the contention that we have a strictly normal sella. I think the clinoid processes indicate pressure erosion, altho it is true the size of the sella is about normal, and yet it seems to me that its base is too deep. There may have been a typical binasal hemianopsia, which, as the process extended, may have left nothing but the present field deviations, that of a nasal hemianopsia of the left side.

The man's history of the case is strongly luetic, and therefore is it not possible, in the absence of symptoms of tumor, that we may be dealing here with a purely luetic attack upon the optic nerves? I have frequently found, in testing the visual fields of a large number of optic atrophies, while the rule is a concentric contraction, we nevertheless have exceptions to this in which large sectors of the field disappear, and thus not infrequently give rise to pictures not unlike those we find in the hemianopsias due to other causes."

Discussion. Dr. Harold Goss stated that the case which Dr. Pratt reported shows a small binasal hemianopsia. There is a small island of vision remaining in the right temporal field altho it cannot be mapped. It is rather indefinite; there being only hand movements in the temporal field. The left eye shows a definite loss of the nasal half of the field for form and color. The neurologist was inclined to favor a diagnosis of isolated lesions in both nerves. Dr. Goss did not think he could agree with the neurologist on that, but at least the possibilities were pituitary tumor, aneurysm of both carotids, isolated lesions of the nerves, or tumor on the floor of the 3rd ventricle. The neurologist did not think much of tumor of the 3rd ventricle, and the X-ray ruled out the pituitary. If the patient had an aneurysm on the carotid he would complain of bruit. As far as isolated lesions go, Dr. Goss said that Dr. McKinley of the Department of Neurology at the University assured him he could show quite a few sections of optic nerve in lues, in which there was thrombosis in the small vessels of the nerve itself.

Dr. Goss said he had never had an opportunity of seeing many lesions of this kind, altho isolated lesions do occur. He felt it would more likely be a lesion in the floor of the 3rd ventricle, choking almost entirely one nerve and a portion of the other nerve, giving binasal hemianopsia. As far as the X-ray is concerned, Dr. Goss said he had asked Dr. Bissell, with Dr. Pratt's permission, if he would kindly explain the difference in the appearance of the X-ray plates which were obtained.

Dr. F. S. Bissell stated that when Dr. Goss and Dr. Pratt asked him to discuss this case he supposed it was to be in defense of his negative findings in the case. He could see now, however, that there is no difference of opinion on this point and that his function, if any, is to speak of the roentgen interpretation of sellar changes in the presence of intracranial lesions.

Dr. Bissell said he could not miss this opportunity to point out the fallacy of a certain tendency on the part of some medical men to unthinkingly refer some of their X-ray cases to commercial laboratories. If physicians

were to make a general practice of sending their refraction cases to opticians instead of to ophthalmologists, this society would be quick to express its disapproval, but such a practice would be no more reprehensible than that of lending support to commercial X-ray laboratories. If there is a place in the medical world for the specialty of roentgenology, the medical men who are devoting their lives and the fruits of their medical educations to this specialty should have the undivided support of the entire profession.

In this case, the first X-ray plates which were made by a commercial X-ray technician were not only badly made but badly interpreted, and served only to mislead the surgeon. Any experienced roentgenologist would have refused to place the slightest reliance upon such evidence as these roentgenograms offer. There are large, anterior mastoid cells, which, with the faulty position of the tube, are thrown across the sella, thus masking and concealing its outlines.

In raying the sella, one must also take into consideration the type of skull with which one is dealing. Thus in a microcephalic, the base of the skull lies in a more perpendicular plane than in a mesocephalic. There is another point in technic which is often neglected, and that is the position of the head with relation to the film. One must be very careful to have the antero-posterior axis of the skull absolutely parallel to the film holder.

Now what pathologic conditions may produce changes in the sella? By reason of the delicacy of the bony structure here, any intracranial pressure will very soon cause an erosion. Hydrocephalus is one of the more common examples of this, but tumors of the hypophysis are of greater interest to those in your specialty. We have tumors arising from the hypophysis and developing within the sella, and we have those growing above the sella turcica. In the former the sella becomes evenly enlarged in all diameters, while in the latter group the entrance of the sella only is enlarged. The floor of the sella may be thinned but not deepened, and the best way to determine whether it is deepened or not is to measure its distance from the floor of the midcranial fossa, a distance which is fairly constant in the normal. In true intrasellar tumors, not only is the sella deepened, but the dorsum is thinned and pushed backward. On the other hand, the extrasellar type produces a flat, saucer like widening of the sella. In large tumors of either type, there may be a complete destruction of the body of the sphenoid.

Basal brain tumors may cause changes in the sella very similar to those described in the extrasellar hypophyseal tumor, but the erosion is likely to be more asymmetric. If one can clearly demonstrate the presence of an erosion of the sella, with or without other skull changes, he can be of great assistance to the surgeon, not only in helping him determine the advisability of operation, but the choice of approach to the hypophysis.

DR. J. A. PRATT stated that of course the principal thing the patient was interested in was whether or not he was going to improve. At the time, Dr. Pratt said he told the patient he ought to be happy that he was a syphilitic. The patient has improved but Dr. Pratt said he did not know how long this improvement will continue. The patient has had four injections of salvarsan, which demonstrates that there is a lesion somewhere in the region of the chiasm.

The results show some improvement anyway.

W. E. CAMP, M. D.,
Recorder.

SAN FRANCISCO COUNTY MEDICAL SOCIETY.

Eye, Ear, Nose and Throat Section.

NOVEMBER 25, 1924.

Intraocular Foreign Body, Glaucoma, Use of Adrenalin.

DR. KASPAR PISCHEL pointed out that epinephrin is the official name of the drug, adrenalin is a proprietary name, the solution on the market contains a small amount of chloretone. Hamburger used the synthetically produced suprarenin; which, according to New and Non-Official Remedies of the A. M. A. is, in all respects, identical with

the natural product; but it is not on the market in San Francisco.

After a short review of the literature since Hamburger's publication, the speaker related his own experience in 18 cases. While in simple and chronic glaucoma the pupils were always dilated and the tension lowered, in complicated cases where operation had been performed, the results were not uniform. The dilatation of the pupils is very desirable for ophthalmoscopic examination and in cases of iritis; in the latter cases the injection causes considerable pain.

Dr. Pischel then showed a case of glaucoma apparently caused by a piece of copper being lodged in the ciliary body for the last 12 years. It had produced the socalled sunflower opacity of the lens. The greenish opacity of the lens is caused by deposition of copper salts between the capsule and the epithelium. The fundus showed total excavation of disc. Tension was reduced by adrenalin injection of 0.3 from 43 to 30. The 3 mm. pupil was dilated to 8 mm. The sight was 2/30, field very much contracted. An attempt to remove the foreign body failed; cyclodialysis done immediately after this attempt did not reduce the tension; therefore iridectomy was made several days later.

Discussions DR. HANS LISSER: This report provides another example of the extraordinary pharmacodynamic powers of this remarkable drug adrenalin. Its action in reducing intraocular tension in glaucoma, bears some similarity to its potency in angioneurotic edema, in giant urticaria or in the urticaria of serum sickness, where swellings are made to vanish with amazing rapidity.

This beneficent action of adrenalin does not necessarily permit the deduction that we are dealing with an adrenal insufficiency, in the endocrin sense of this term. From this therapeutic effect alone we are not justified in concluding that glaucoma, or for that matter asthma or angioneurotic edema, are ductless gland diseases. We could as well diagnose hypopituitarism during labor, since injection of pituitrin hastens expulsion of the fetus.

Nevertheless, an incretory participation either in the origin or sudden appearance of glaucoma is not unlikely. Indeed, such a conception has been supported by several considerations and advanced by several authors. Imre has even suggested determinations of intraocular tension as a diagnostic aid in endocrin diseases (this requires further study). Hertel found that patients with hyperfunction of the thyroid have low intraocular tension and patients with glaucoma have signs of hypofunction of the thyroid. In a case of pregnancy complicated by osteomalacia, Imre found an extraordinarily low tension of 5 mm. Hg., lower than that of a cadaver. Fridenberg considers glaucoma from the endocrinologic point of view as an exudative, or hypersecretory disturbance, due to sudden failure of vagus tone under sympathetic irritation.

In any case, no final judgment is possible at present as to the role played by the ductless glands in the pathogenesis of glaucoma. Experiments are much to be desired that would forge a binding chain of evidence between such disconnecting links as endocrin activity, vagotonia, sympathicotonia, protein sensitivity, acidosis and calcium deficiency as exemplified in asthma, hay fever, rhinorrhea, urticaria, angioneurotic edema, glaucoma, and migrain and epilepsy.

DR. W. S. FRANKLIN suggested that the injection should not substitute operative measures, which accomplish their object in a large number of cases.

DR. OTTO BARKAN: We have tried glandular extracts in a number of cases of glaucoma without results. In one case of glaucoma associated with a vascular neurosis, hypodermic injections of adrenalin lowered intraocular tension for from several hours to a day. We found that subconjunctival injection of adrenalin is particularly useful in iritis with secondary glaucoma in as much as it lowers tension and dilates the pupil at the same time.

DR. GEO. HOSFORD: We have had essentially the same results as Dr. Pischel in cases at the University of California clinic.

DR. PISCHEL, in closing, stated that injection is no substitute for operations in glaucoma, but is a great help for the control of glaucoma in its different

stages and also as a preliminary to operation or to examination.

Use of Thyroid in Incipient Cataracts.

Dr. Geo. N. Hosford said twenty-four patients with senile cataract of various degrees of maturity were treated over a period of from three to twelve months with thyroid substance (Armour), in doses of from three to six grains. Fifty per cent of the cases showed improvement of 0.1 or more. Thirty-seven and one-half per cent showed no change, while eight per cent became distinctly worse. One case improved in one eye and became worse in the other. The greatest improvement obtained was from 0.3 to 0.6. This was in a man of thirty-eight who took large doses over a long period.

In one case not included in the above series, a man of forty-seven with incipient cataract in both eyes had a needling done in the left eye six months before we saw him. The absorption of lenticular material seems to have been remarkably accelerated by thyroid substances in doses of three to six grains per day. In two cases with secondary cataract the results were negligible. We intend now to try pure thyroxin and also parathyroid substance.

Discussion. Dr. Hans Lisser said this admirable paper of Dr. Hosford deserves hearty commendation. No flamboyant claims are made; it exemplifies a sincere effort to arrive at truth by thoro methods of study.

Determinations of the metabolic rate are desirable if for no other reason than to discover in which cases an actual thyroid deficiency is being supplemented by the thyroid extract administered. In those cases where the rate is normal, the beneficial action would have to be interpreted as that of a tissue stimulant, a metabolic tonic. We have by no means exhausted the possibilities of thyroid therapeutics as a general tonic, in which respect it is far more potent than iron, quinin, or strychnin, though it must be used with exceeding care.

I am not inclined to think that any of the improvement noted was due to a possible admixture of parathyroid material. We are only certain of one clinical entity due to parathyroid insufficiency, namely, tetany, and there are no authentic instances on record where this condition has been relieved by the use of any of the commercial parathyroid preparations available. Parathyroid extracts in the treatment of tetany are in the same position that pancreatic extracts were in the treatment of diabetes before the discovery of insulin. Their use was logical, but they were impotent. When an active parathyroid extract is discovered its trial in the treatment of cataract will be indicated, since cataract is an important complication of tetany, and has been experimentally produced in animals (Erdheim) by removal of the parathyroids.

It is indeed true that trophic degenerations affecting the skin, hair, teeth, nails and lens are characteristic of senility, quite in the same way as are thickenings of arteries and degenerative changes in kidney, brain and heart. Is it sound reasoning to assume that these gradations of decay are due to endocrin disease and therefore amenable to organotherapy? Is it not more reasonable to believe that the ductless glands are sharing in the aging process, in the same degree and simultaneously with all other tissues of the body? Is it sound practice to attempt to whip the weary old horse into a ridiculous and dangerous gallop? Might it not prove to be his last spurt when he might have walked for some time longer?

This is no criticism of the use of thyroid extract in cataract, except as it may suggest a distinction between the true senile cataract of old age and the cataract of a premature senility. And herein lies the kernel. A premature senility, a cataract between thirty and fifty, is quite a different matter. Such premature decay is most likely due to disease processes of thyroid, pituitary or gonads, that have aged the glands before their time. Here most certainly do we have indication for glandular therapy.

Meanwhile a judicious trial of thyroid extract in the treatment of cataract, in conservative dosage, under very careful supervision, may prove worth while as indicated by this excellent prelimi-

nary paper. Both Dr. Kerr and Dr. Shepardson deserve credit for their share as internists in aiding the study and observation of these patients.

WARREN D. HORNER,
Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA.

SECTION ON OPHTHALMOLOGY.
OCTOBER 16, 1924.

Obstruction of Central Artery of Retina During Intranasal Operation.

DR. WM. ZENTMAYER presented the case reported on p. 211 of this journal.

Discussion: DR. FREDERICK KRAUSS felt that, in view of the great frequency of operations performed on the middle turbinate bone and other structures in the nose, the rare occurrence of the eye lesion is most likely due to an anatomic anomaly. The os planum is frequently as thin as tissue paper and fragile. An inadvertent pressure or twist of the scissors could cause a fracture with profuse bleeding. The hemorrhage could thus pass backward below the periosteum and press upon the vascular supply of the eye. This thought is further strengthened by the fact that usually the ocular injury is on the same side as the nasal operation.

DR. B. ALEXANDER RANDALL stated that he had never seen a case so immediately due to a nasal operation as that cited by Dr. Zentmayer, and felt that any such obstruction must have been toxic rather than an embolic particle from a heart valve detached in a sort of agonal spasm of the myocardium—akin then to de Schweinitz's occlusions of the retinal vessels in his "toxic amblyopias." Ziern's claims of a nasal causation of all sorts of eye troubles has always seemed to him overdrawn, altho he had seen, in his experience covering forty years, a few substantiations. Gruening, of New York, was inclined to accept more of them than his own experience justified.

Dr. Zentmayer said that no doubt an intranasal anomaly might lead to a direct involvement of the vascular spaces. It must not be forgotten that the vast majority of these cases of blindness have followed paraffin injections and there can be very little question that here it is due to an embolus, and probably the same cause applies when it follows an intranasal operation.

The cases recorded in Dr. Packard's paper, 1917, are of a different class, as in these recovery took place, while in the paraffin cases the eyes remained blind or nearly blind. He felt that ultimately it will be found the cause is a more direct one than the supposition of a circuitous passage of the embolus thru the lungs.

Experimental Studies in Immunity in Herpes Simplex.

DRS. SIGMUND S. GREENBAUM and MALCOLM J. HARKINS detailed the results of studies made at the Research Institute of Cutaneous Medicine, in reference to herpes simplex, which is considered a generalized specific infectious disease, with certain localizing symptoms, as shown by experimental observations in both the human subject and in laboratory tests on the rabbit, in whom the active agent, a filterable virus, under certain conditions produces a severe keratoconjunctivitis and in some instances a fatal encephalitis.

The experiments on immunity produced by a previous mild herpetic infection apparently showed that none of the rabbits which had recovered from a mild herpetic virus infection had the slightest immunity of the cornea when reinoculated with a strong herpetic virus, either in the same eye or in the eye opposite to that previously infected with the mild virus; that a rabbit inoculated 38 days previously with a mild herpetic virus (Strain II) did not succumb to an intracerebral inoculation of the stronger virus, whereas the control rabbits developed an encephalitis in 8 to 14 days, respectively; that a rabbit, inoculated and recovered 50 days previously from a mild herpetic virus infection, developed a keratoconjunctivitis when inoculated with the stronger strain but did not develop an encephalitis (the control rabbit developed cerebral symptoms in 8 days); that three rabbits, previously infected with a mild herpetic virus, developed keratoconjunctivitis with

cerebral symptoms in from 8 to 13 days after inoculation with the strong herpetic virus. Apparently no immunity had been produced by the previous herpetic infection.

The experiments on induced immunity showed herpetic encephalitis in 75% of animals injected subcutaneously with 40% suspension of herpetic brain. One surviving rabbit developed prolonged keratoconjunctivitis and ulcers following corneal inoculation with active virus, and reinoculations of the eye caused marked kerato-conjunctivitis with rapid recovery to normal in 13 days. As many as twelve subcutaneous injections of a one per cent suspension of killed herpetic brain virus in 2 cc. amounts gave neither corneal nor general immunity, nor did one subcutaneous injection of one per-cent suspension of living herpetic brain virus confer sufficient immunity to withstand a later corneal inoculation. Two injections of 2 cc. of the same vaccine, at 6 day intervals, did not prevent the development of herpetic encephalitis.

Discussion: Dr. Wm. Campbell Posey said that Dr. Arnold Knapp had recently informed him that at the last Heidelberg Congress, Professor von Szily had reported that he had been able to induce sympathetic ophthalmia experimentally by injecting bacteria taken from a human cornea, the site of herpetic diseases, into the ciliary body of a rabbit. Sympathetic inflammation developed in the fellow eye of the rabbit a few weeks later.

Vascular Lesions of the Retina in Young Persons.

Dr. Harry Friedenwald (by invitation) showed twenty lantern slides of various vascular retinal lesions, and said that abnormal conditions of the retinal arteries and veins observed in the young are found in association with a number of well known fundus diseases: (1) Recurrent retinal and vitreous hemorrhages; (2) retinal disease with massive exudation, (Coats' Disease) including von Hippel's disease; and (3) acute circumscribed exudative chorioretinitis.

1. *Recurrent Retinal and Vitreous Hemorrhages*: He said that many years ago he had described marked changes in the caliber of the retinal vessels and especially of the veins, constrictions, dilatations, engorgement, the formation of varices, and of newly formed vessels projecting into the vitreous in cases of recurrent retinal and vitreous hemorrhages in the young. He described several cases, two of which had been under observation for many years.

2. *Retinal Disease with Massive Exudation*: These cases were first grouped under the above heading by Coats. The vascular anomalies which characterize them are: tortuous and engorged veins, aneurismal dilations, and sclerosis of the vessels and perivasculitis. Coats ascribes these conditions to vascular disease and consequent hemorrhages, often profuse, into the external layers of the retina and their subsequent organization together with degenerative changes in the retina.

Appearances similar to these are found in other conditions. Von Hippel in 1904 described a curious vascular tumor formation, an angiomatosis retinae, with disease of the retinal vessels. A similar picture was reported by Knape, but was due to glioma of the retina. We are forced to conclude that these conditions, similar in ophthalmoscopic picture, may be produced by very different underlying lesions.

3. *Acute Circumscribed Exudative Chorioretinitis*: In this affection retinal vascular disease is not infrequently observed. Dr. Friedenwald stated, that in 1902 he described the vascular affection as a perivasculitis, showing itself in numerous white spots arranged along the sides or upon the surface of the vessels. The vasculitis observed ophthalmoscopically, was of the same type as that seen in those of the first group, and this close relationship is also found in the association of acute choroiditis and hemorrhage into retina and vitreous. The condition was ascribed by Axenfeld and Stock to tuberculosis, and Fleischer has brought forward pathologic evidence in support of this view.

Conclusion: Vascular disease of the retina is a frequent accompaniment of a number of pathologic conditions of

the fundus. It must be noted, however, that the vascular lesions seen with the ophthalmoscope are sometimes at a distance from the gross retinal lesion. In some conditions the vascular disease is the cause, as in the hemorrhages into the retina and vitreous and probably in the deep hemorrhages of retinitis with massive exudation; in others, the vascular conditions may be the result of primary retinal disease producing inflammatory and obstructive affections of the vessels. It is not known if the primary vascular disease is at times congenital, or under what conditions it develops when acquired, but tuberculosis is believed by many to play an important part.

Discussion: Dr. Francis H. Adler said that the most striking feature of all these lesions is that they are confined to the veins. In the vascular lesions of later life, especially those associated with arteriosclerosis, hypertension, and chronic nephritis the arterial side of the vascular bed is that which is chiefly involved. Two factors are to be thought of in the production of these arterial lesions—namely, a diseased arterial wall, and a raised arterial pressure. Dr. Friedenwald has pointed out the pathologic changes which have been found in the veins of these adolescent hemorrhages. It might be pertinent to investigate whether the venous pressure were elevated in these cases. The use of Bailliart's dynamometer might give valuable information regarding this point.

Dr. Zentmayer said that there are certain cases which come within the first division of Dr. Friedenwald's classification in which the symptoms are so characteristic that they form a definite group. These are the typical relapsing cases of adolescence, occurring much more frequently in males and most frequently in the left eye, and are associated with massive hemorrhages into the vitreous. Many of these lose useful vision and often become permanently blind in one eye. As to etiology, in 1920, he suggested that such cases might be of endocrin origin. This view has since been expressed by Dr. Fridenberg, Dr. Wilmer, and others. Professor Fuchs and Dr. Verhoeff both consider that cases are not always of tuberculous origin.

As to the second group, retinitis with massive exudation, it is probable that circinate retinitis and the class of cases first described by Nettleship belong with this group. Nettleship's cases occurred in children, following measles or one of the other exanthemata. The retina which contained thickened plaques became detached, from subretinal and intraretinal hemorrhages. In one of his own cases it was necessary to enucleate such an eye on account of secondary glaucoma, and the subretinal space was found to be filled with a serum containing a large amount of cholesterin. This finding supports the view that they belong to the Coats' class, as one of the diagnostic points in massive exudate is the presence of cholesterin crystals in the retina.

Dr. Ziegler said that the cases Dr. Friedenwald refers to are similar to those recorded by Eales, in which subretinal hemorrhages were the sequels of a vasomotor neurosis engendered by temporary constriction of the blood vessels of the alimentary and genital tracts. The cases that Dr. Ziegler personally had seen depended more particularly on constipation and errors of diet. In one case, a woman aged 21 years, an inmate of the Blind Asylum for seven years, suffered attacks of constipation for periods of one or two weeks, following dysentery. She had recurrent hemorrhages in each eye, subretinal in the left, causing detachment, and ciliary in the right, causing cortical cataract. The latter was extracted in 1890, and was followed later by a V-shaped capsulotomy on a dense capsule. An error of diet, eating strawberries, caused recurrence of the hemorrhage. When this cleared up proper refraction gave her normal vision for both distance and near, which has been retained for over thirty years. Dr. Ziegler said that he had presented before this Section, about fifteen years ago, a group of three or four young females, with recurrent hemorrhages caused by chronic constipation. The cases responded to mild but persistent catharsis. One had, in addition,

hemophilic extravasation and nasal obstruction which was relieved by intranasal cauterization and the elimination of peaches from her diet. He thought that like all obscure lesions, there are many idiosyncrasies that demanded most careful study.

C. E. G. SHANNON, Clerk.

COLORADO OPHTHALMOLOGICAL SOCIETY.

November 15, 1924.

DR. D. H. COOVER, Presiding.

Retinal Detachment.

W. C. BANE, Denver, showed a man, aged seventy-two years, who had come on account of defective vision of the left eye for the previous two months. The left vitreous was hazy, and the retina detached in the upper nasal quadrant. A month later the area of detachment had increased considerably. The vision of the other eye was very poor, changes having occurred in the crystalline lens. Treatment had consisted of potassium iodid internally.

Discussion. EDWARD JACKSON, Denver, could not see anything that suggested the presence of tumor beneath the detachment, but the retina seemed to be thickened.

Contusion by BB Shot.

W. M. BANE, Denver, showed a youth, aged nineteen years, who had come with a history of the left eye having been struck with a BB shot in 1912. The shot had not penetrated the eye. Vision had been limited for some years to counting fingers, but at the time of report was nearly nil. The left pupil was irregular from a tear in the iris, the cornea small and almost conical, the lens cataractous. Tension had been forty-eight millimeters but had recently increased to sixty millimeters. Treatment had consisted of pilocarpin.

Discussion. F. R. SPENCER, Boulder. Would it be a good plan to do an iridectomy to reduce the tension, at the same time perhaps needling the lens débris?

EDWARD JACKSON, Denver. The anterior chamber is very deep at the center, but I thought it rather shallow at the periphery, and it is possible that the iris is bound down there, in which case a broad iridectomy would be likely to give relief.

W. H. CRISP, Denver, thought that the ciliary body might have been damaged and have become shrunken, drawing the iris back and also the remains of the lens.

Penetrating Injury of Limbus.

W. H. CRISP, Denver, showed a girl, aged eight years whose left eye had been injured by a missile, possibly roofing slate, thrown by a schoolmate. Vitreous had protruded thru a small wound at the lower limbus. The resulting hemorrhage had been rapidly absorbed, so that the fundus was very distinctly visible. The eye was almost quiet, but what looked like a small granuloma protruded thru the limbal wound, and there were scattered deposits of pigment around the blood vessels on the optic disc and at several points in the lower part of the fundus, as well as several areas below in which the retinal pigment seemed to have been partly absorbed. There were slight opacities in the lower part of the crystalline lens. The vision of the eye was 5/20.

Discussion. W. C. FINNOFF, Denver. In the lower nasal quadrant of this eye, by transillumination, there are visible radial striae running from nine o'clock downward toward six. This may be exudate from the ciliary body. It might later lead to the formation of bands or scar tissue, with retinal detachment. In a case seen several years ago the radial striae had been completely absorbed and vision had become very good, but four years after the injury the patient came complaining of metamorphopsia, and retinal detachment developed rapidly.

Laceration of Upper Eyelid.

W. H. CRISP, Denver, presented a man whose left upper eyelid had been torn completely thru into several pedunculated strips, as the result of an automobile collision. Fortunately it had been possible to suture the eyelid, in two tiers, shortly after the injury, and for the most part the scars were almost imperceptible, and the lid

margin normal in appearance. The sutures had been taken out from the second to the fifth day, most of them within forty-eight hours.

Discussion. W. C. BANE, Denver, referred to a case in which a good deal of deformity had been produced by incorrect repair by a general practitioner, but in which very satisfactory results had followed later removal of the sutures and coaptation of the raw surfaces.

W. C. FINNOFF, Denver. Injuries to the eyelid which have healed after repair by the general practitioner are usually very difficult to treat, because the general physician does not realize the importance of maintaining the anatomic relationship between the skin, the lashes, and the tarsus. In doing a secondary repair at the margin of the lids, an overlapping flap gives a better result than a vertical flap.

Uveal Tuberculosis.

W. C. FINNOFF, Denver, presented a man, aged forty-five years, who had come complaining of blurred vision in the right eye, of a week's duration. When first seen, on January 22, 1924, a few small gray punctate opacities had been present on the posterior surface of the cornea below. The iris was thickened and the vessels slightly engorged, and there were three small yellowish nodules in the iris stroma near the base below. Fundus details were obscured by vitreous haze. In the lower portion of the left fundus, near the periphery, were two large oval patches of pigment that represented old healed lesions. The chest was negative. Two abscessed molar teeth had been removed, without improvement. Under atropin, hot applications, and potassium iodid, the vitreous became clearer, and on January 29th the two large yellowish-green oval masses were to be seen in the fundus, one on the nasal side and a large one on the temporal side, their edges bordered by a thin band of pigment. No blood vessels could be made out. On February 9th, 1/5,000 milligram of tuberculin (B. E.) had been given subcutaneously without reaction. The dose was gradually increased, until on March 1st a focal reaction manifested itself by an increase in the number of punctate deposits on the cornea, by a minute hemorrhage in the episcleral tissue at the lower limbus, and by pain in the eye. A few days later the whole posterior surface of the cornea was covered with large deposits resembling cold mutton fat, and no fundus reflex was visible with the ophthalmoscope. By March 22nd the substantia propria of the cornea was infiltrated with a fine granular exudate clearly visible with the higher magnification of the corneal microscope, and there were lattice like markings in the deep section of the cornea, due to folds in Descemet's membrane. Under gradually increased doses of tuberculin, by July 9th the outline of the fundus lesions was again visible. At the time of report there were merely two small deposits on the posterior surface of the cornea, and three larger oval yellowish tubercles could be seen in the fundus, altho the disc was invisible, and the only artery that could be seen was the upper temporal. The last dose of tuberculin B. E., one milligram, had been given a month previously.

Discussion. G. L. STRADER, Cheyenne, Wyoming, referred to a case already mentioned before the society, in which intramuscular injection of the patient's own serum had lowered the coagulation and put an apparent stop to recurring hemorrhages into the vitreous, normal vision being recovered. The boy had come back a month ago with a small hemorrhage, and under the same treatment the coagulation time had again been cut down from fifteen to four minutes.

DR. FINNOFF (closing). We can differentiate between two types of tuberculosis of the retina. The man shown tonight has an entirely different type from the recurring hemorrhages into the retina and vitreous. This is a case of uveal tuberculosis, affecting primarily the uveal tract. The hemorrhagic type involves primarily the retinal veins. I should not have dared to start with so large a dose of tuberculin in the latter type.

Visual Standard for Public Schools.

M. J. GALE, Denver, presented a girl, aged fourteen years, whose corrected vision was R. 20/200, L. 20/100, and

in whose fundi there were numerous areas of choroidal degeneration. The nervehead was pale, and there were a good many cholesterin crystals. The Wassermann test taken twice was negative each time. The teeth and tonsils were O. K., and urinalysis negative. X-ray of the nasal sinuses was also practically negative. The case was shown mainly to bring up the question of the standard of vision by which a child might or might not be excluded from the public schools.

Discussion. EDWARD JACKSON, Denver. The appearance of these patches at the posterior pole of the eye reminded me of some cases of macular coloboma. The question raised by Dr. Gale is important. There are more such cases in the community than are now known of. It is generally agreed that these patients ought not to be brought up as blind children. This patient with one fifth of normal vision in the better eye is certainly below the borderline of the cases that ought to go to the ordinary classes in the public schools. Such cases should be grouped together for special teaching.

E. M. MARBOURG, Colorado Springs. In the State blind school the law provides that the child can be admitted if instruction can not be received with the same facility as by other children in the public schools. We encourage such children to use their eyes as much as possible.

W. A. SEDWICK, Denver. If this child is going to get worse she should be taught the Braille system.

W. C. BANE, Denver. There may be a good many such children in this city who might be gathered together and specially taken care of.

Tubercles on Iris.

G. F. LIBBY, Denver, presented a woman, aged seventy-six years, who had come from St. Louis with a history of serous iritis or punctate keratitis later developing into glaucoma in each eye. Iridectomy had been done on each eye, altho previous to the first such operation in the left eye a tubercle had developed at the upper temporal margin of the left iris. Several half doses of salvarsan had been given in St. Louis, altho the Wassermann test had always been negative. Tuberculin had later been given. There had never been a general reaction to tuberculin. When the patient was first seen by Dr. Libby the right eye showed a tubercle on the nasal margin of the iridectomy coloboma and one below it, and the left eye showed a tubercle on each margin of the coloboma and one below it, and a nebula in the lower half of the cornea. The discs were cupped and whitish and there were vitreous opacities, as well as what suggested a healed choroidal tubercle in the left eye. The vision was R. 20/25, L. 20/160. The tension of each eye was normal. Pilocarpin had been continued, and during the months that the case had been under observation the tubercles had decreased in size and the eyes had been quiet. The tonometer reading this day had been R. thirty-four, L. thirty millimeters.

Discussion. EDWARD JACKSON, Denver, commented on the large dose of tuberculin which had apparently been given elsewhere. He thought that small doses of tuberculin, B. E. should be continued in this patient.

Partial Optic Atrophy.

J. M. SHIELDS, Denver, presented a woman, aged thirty-five years, who had never consulted a physician regarding her eyes until she came to Dr. Shields' office, altho her vision had been failing rather rapidly for the two years, and she had had many pairs of lens from opticians. The vision was R. 20/40, L. 20/100 with correction by a minus lens. The patient gave a history pointing to gallstones, but various examinations, including those of nose and throat and X-ray of the chiasm and the nasal sinuses, were negative. There was extensive pyorrhea. Each optic nervehead was very pale in the temporal quadrant. The right field showed no contraction, but the left field showed marked contraction on the nasal side.

Discussion. W. C. BANE, Denver. I have never seen nerves that looked exactly like these. One sector of each nerve seems without nutrient vessels.

E. M. MARBOURG, Colorado Springs, referred to a case with pallor of the

nerveheads in which multiple sclerosis had later been frankly revealed.

EDWARD JACKSON, Denver. There were some points in this history which suggested hereditary optic atrophy, or Leber's disease. There is also some possibility of disturbance of the pituitary body.

Sarcoma of the Choroid.

G. L. STRADER, Cheyenne, Wyoming, presented a man, aged sixty-two years, the vision of whose left eye had been failing for a year, and was now 20/70, unimproved by glasses. A large spherical, pigmented mass protruded into the vitreous below and inward. In December, 1919, this patient had had vision of 20/20 plus with the eye now affected.

Discussion. EDWARD JACKSON, Denver. I have never seen anything that looked more like a sarcoma of the choroid than this does, nor any sarcoma more heavily pigmented.

Tenotomy of Inferior Oblique.

D. A. STRICKLER, Denver, presented a little girl, on whom tenotomy of the inferior oblique had been done. The patient had been shown before the society on November 18, 1923, at which time the opinion had been expressed that the left inferior oblique was overacting. After that prisms of four degrees base up in the right and four degrees base down in the left eye had been been given with the refractive correction, and for a time the patient had held her head nearly straight, whereas before it had been greatly inclined. The patient had not reported further until the summer of 1924, when Dr. Duane had offered a diagnosis of partial paralysis of the right superior and overaction of the left inferior oblique. Nine days ago tenotomy of the left inferior oblique had been performed; and there was now no diplopia in any position of the eyes, altho there was still a hyperphoria left.

Discussion. W. M. BANE, Denver. We made a rather long incision at the lower rim of the orbit, thru the skin and subcutaneous tissues. The actual field of operation is deeper than one would suppose. The picking up of the muscle itself and doing the tenotomy could be accomplished much more easily if done more frequently, but Dr. Strickler found the tendon very easily. But the muscle itself was so small that to have removed a section of it would have been very difficult. Tenotomy was not difficult, the tendon being cut just back of the lacrimal crest.

EDWARD JACKSON, Denver. One interesting point is that this patient was seen when she was much younger and at that time had no fault in the muscles. Since then she has had scarlet fever, of which the muscular defect was very likely a sequel.

WM. H. CRISP,
Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

APRIL 21, 1924.

J. BROWN LORING, Presiding.

Glaucoma Operations.

DR. GEORGE WOODRUFF presented for Dr. Buck, a case of secondary glaucoma, dating back to 1912, at which time the patient was struck in the left eye by a piece of hard dirt. In July, 1914, he entered the Infirmary with a traumatic cataract of the left eye. This was operated, he made a good recovery, and was discharged. In January, 1915, he returned complaining of injury to the same eye. There was no light perception, and the eye was atrophic and inflamed.

The right eye had been struck with a fist, was painful, and he could not read. Tension of this eye was soft, there was some ciliary injection, and exudate in the pupil. On February 15, 1915, the left eye was enucleated; he was put on treatment of neosalvarsan, mercury, potassium iodid, salicylates, diaphoresis, atropin, dionin, (subconjunctival injections). On June 27, the tension was 37.5, and one month later he was discharged with the eye quiet, tension normal. Vision with glasses in the right eye was 20/30, plus 3.

On February 15, 1924, he returned complaining of poor vision; it had diminished to 20/30 minus. Examination showed deposits on posterior surface of cornea. Atropin and hot applications were prescribed; three days later the tension was 41 under eserin.

It was found that he had been wearing a broken artificial eye, which he was ordered to discontinue. On February 20, the tension was 37, and a trephine operation without iridectomy was performed; followed by gradual improvement. He was kept under atropin and dionin, for several days. Wassermann was persistently negative. Vision at this time with glasses was 20/16, minus 2.

Glaucoma Simplex With Lues.

This patient presented himself at the Infirmary February 1, 1924, with a history of gradual loss of vision for eight years, beginning in the right eye. About a year ago, the sight failed more rapidly. There was no pain, redness or halo at any time, but he seemed to see "thru a sort of mist." He had had changes of glasses several times without benefit. Last fall he consulted an out of town specialist, who pronounced it pressure on the optic nerve, and prescribed medicine and diet. He went to him three months without benefit. In December he visited a Chicago clinic, where they thought the condition due to lues, and sent him to the Public Health Institute. Here he had three positive blood Wassermanns, but negative spinal Wassermann. Thoro physical examination was negative for evidence of lues, and he was advised to go to the Eye and Ear Infirmary. History of primary luetic lesion thirty-one years ago was elicited.

On first admission to the Infirmary, vision was R. E. 6/200, L. E. 20/100; tension 36 in each eye. Bilateral glaucomatous cupping. On February 4, fields of vision showed entire loss of nasal field and central vision; but some field preserved in upper temporal region. L. E. Quadrant defect involving whole inferior nasal field. The diagnosis was simple glaucoma, and the patient was placed under eserin treatment, which controlled the tension for a few days, but after that it rose. On February 20th, the tension was 37 in both eyes. Elliot's trephining operation, with iridectomy, was performed on the right eye, and seven days later, iridectomy by Reese procedure on the left eye. Both eyes presented broad, low, but distinctly elevated subconjunctival filtration spaces, fairly thick, well nourished conjunctival covering. Vision at present, R. E. 6/200; L. E., with glasses, 20/40. Blood Wassermann, April 18th, 4 plus. Tension remained normal since the operations.

Unilateral Exophthalmus.

DR. JACOB LIFSCHUTZ presented a young lady, 23 years of age, referred to him on account of bulging of the left eye, of three weeks' duration. She stated that her mother died at age of 53 of exophthalmic goitre. The patient was myopic in each eye, corrected by glasses to normal vision. Metabolism test was normal. Except for the unilateral exophthalmos, there were no signs of exophthalmic goitre found. Subsequently, however, she developed severe symptoms of exophthalmic goitre and went to the Mayo hospital for extirpation of the thyroid. The interesting features of this case were, that contrary to usual findings, the exophthalmos appeared before the tachycardia or enlarged thyroid; also that the unilateral exophthalmos persisted despite the fact that the thyroid was removed.

Lymphosarcoma.

DR. JACOB LIFSCHUTZ showed an Italian laborer, aged 62, who presented himself complaining of a growth in the right upper lid, of three months' duration. No previous illness of the eye, or other constitutional illness; no pain in the eye at any time. Ocular examination practically negative, with the exception of the visible growth on the inside of the upper lid. It started in the tarsus and extended all along the lid, and now practically covered the entire inner surface of the lid; well circumscribed, hard, the skin not being adherent to it. No adenopathy. It was lobular, and a new lobule had appeared at the external canthus in the last five days. Wassermann was negative. A section was taken, which showed under the microscope numerous small cells with connective tissue between them. Clinically it looked like a malignant growth—a lymphosarcoma. No treatment had been instituted as yet.

Discussion. Dr. George F. Suker said unilaterality of exophthalmos in toxic goiter, socalled Basedow's disease, was rather unusual, tho occasionally one found this condition present a long while before either the tachycardiac or nervous symptoms appeared. Such cases presented a very good clinical prognosis. If the exophthalmos developed after the other symptoms manifested themselves, then the prognosis as to duration and severity was less favorable. The unilateral exophthalmos was rather uncommon, it now and then appeared in women in or about the menopause, but more often, even in these cases, the exophthalmos was bilateral. He had such a case under observation, this being the third case, in each of whom thyroidectomy was done, the patients now being myxedematous. This suggested that Basedow's disease, appearing at or during the menopause, was a compensating toxic exophthalmos. Consequently, in these patients, early thyroid extirpation was not advisable until after the menopause, treating it solely as a medical case. Exophthalmos was preferable to the myxedema.

There was no question that Dr. Lifschutz's case was a pure example of Basedow's disease. It was most difficult, almost impossible, to institute measures to reduce the exophthalmos. The superior sympathetic ganglion as well as the connecting ones from fibers that arise from the middle and inferior ganglion, must be extirpated. These latter fibers not only enter the superior ganglion, but anastomose also with the superior fibers above the ganglion. In extreme cases, not only the excision of the ganglion and fibers, but also a blepharorrhaphy was indicated. The exophthalmos was caused by a numerical hypertrophy of the orbital tissues, due to the stimulation of the trophic fibers in the sympathetic system. Even at death and after death, the eyeball does not recede.

Dr. T. Faith mentioned a case seen a number of years ago. There had been a thyroidectomy done a year and a half previously. Both eyes were very much proptosed; one cornea was in very bad shape, and in spite of everything that could be done, it perforated and was lost. The second eye began to suffer from ulcers. The conjunctiva was sutured over the cornea for protection, and this failing, the lids were sutured together, and both the superior and middle ganglia of the cervical sympathetic were excised on the same side as the last eye affected. This accomplished absolutely nothing. The exophthalmos continued to increase, and continued until the second eye was lost from corneal ulceration. Finally, both eyes having been removed and the sockets healed, it was found absolutely impossible to introduce an artificial eye in either socket, as there was such an enormous overgrowth of fatty tissue in the orbit. Finally, it was necessary to open the conjunctiva and remove a good sized portion of fat from each orbit, in order that an artificial eye might be worn. All this occurred eighteen or more months after the thyroidectomy had been performed, the patient's tachycardia having disappeared and his weight having become normal. Except for the loss of his eyes, the man continued still in good health, all of his nervous symptoms having disappeared.

Dr. Michael Goldenburg spoke of a case of unilateral exophthalmos at the Infirmary, in a young man in whom the exophthalmos was very marked, with retraction of the upper lids. Some neurologists contend that unilateral exophthalmos cannot be present. He rather thought it was Basedow's disease, but the neurologist was inclined to think it was something in the orbit pressing upon the sympathetic nerve, which caused the condition. Dr. Lifschutz gives a history of the metabolic rate being normal in this case. That would almost exclude thyroid.

Dr. Lifschutz, in answer to Dr. Goldenburg, said that the only way he could account for the metabolic rate being normal was, that the patient's physician had had her on Lugol's solution, which probably lowered the metabolic rate.

Melanosarcoma of the Iris.

Dr. Clarence Loeb presented a case which came to Michael Reese Dispensary on April 15th, complaining of intense pain in the head and in and

around the eyes. Refraction showed hyperopic astigmatism. In the left iris, at about nine o'clock, a black pigmented, raised spot about twice the size of the head of a pin was found. The dilated pupil showed that it did not project posteriorly, but there was distinct projection anteriorly. Melanosarcoma was diagnosed from the appearance and from the general knowledge of tumors of the iris.

Discussion. Dr. Harry Gradle, referring to the findings under the slit lamp, stated that a spot probably one to 1½ mm. in diameter was found. Dilation of the pupil showed that there was no protrusion of the tumor posteriorly. It lay superficially on the iris, but it stood out more than the rest of the iris. No pigment spots showed. No new vessels or tissue beyond that described was visible.

Glaucoma in a Case of Congenital Coloboma.

Dr. Michael Goldenburg presented a case which had been seen by the Society previous to operation. The patient entered the Infirmary on March 8, 1924, with a history of pain in the eye for a period of about one year. There was very little injection in the right eye; vision R. E., 20/100; L. E., 20/20. Examination revealed a congenital coloboma not extending to the root of the iris. There was cupping of about 3 D. Tension 49, two days later 39, and three days later 53. Iridotasis operation performed five days later, the iris being grasped at about ten o'clock and a small portion being brought through the limbus wound. The tension March 18th (the Saturday previous to this meeting) was 24, and the patient was free of all symptoms. One of the members, after observing the case, questioned the fact that the sphincter was not incarcerated. Personally Dr. Goldenburg preferred not to evert the iris. The pigment of the lining of the posterior surface of the iris comes off very freely under friction, and in grasping it, this frequently occurs no matter how careful the operator might be. In this case he had tried to get a double fold into the wound, and so far thought the attempt had been successful.

The Preglaucomatous Eye.

Dr. Harry S. Gradle read this paper, published in full in the A. J. O., v. 7, p. 603.

Newer Operative Procedures in the Treatment of Glaucoma.

Dr. Robert H. Buck read this paper, published in full, p. 218.

Uveitis, Some of Its Collateral Manifestations.

Dr. Robert Von der Heydt read a paper on this subject published in this volume p. 129.

Discussion. Dr. William H. Wilder said that Dr. Gradle's paper was particularly interesting in correlating the different factors that might play a role in bringing about severe hypertension of the eyeball, such as might be observed in acute congestive glaucoma. It offered considerable food for thought and possibly for experimentation. There might be a lack of tonicity of the vasomotor sympathetic nerve fibers that controlled the amount of blood in the vascular spaces of the choroid. It seemed reasonable to suppose that some form of stabilizer must exist in the eye to prevent intraocular pressure from becoming too great when increased systemic vascular pressure was present.

It seemed probable, too, that some relation might exist between high blood pressure, with its frequently attendant vascular sclerosis, and high intraocular pressure, altho most authors deny any causal relationship. The walls of the choroidal vessels may have undergone a change that prevented them from responding in the customary way to the influence of the sympathetic nerve. The glaucomatous eye was never a well eye, and as Risley said, "Glaucoma rarely occurs in individuals in good general health." Dr. Wilder spoke of the frequency with which glaucoma was found developing in persons who were run down by diseases that had lowered their vitality, affected their vascular system, influenced their metabolism, and affected their nervous balance. It seemed that there must be a closer relation than heretofore suspected between tension in the nervous system and hypertension in the eye.

With due respect to the Weber-Knies theory, that blocking the filtration angle by the root of the iris was the cause of glaucoma, a doubt might justly be expressed as to this being the only cause, or the original cause. Something probably preceded the blocking of the angle, possibly an alteration in the quantity or quality of the secretions, some biochemical change, it may be, aided by some nervous influence thru the channels of the sympathetic. It is true that most glaucomatous eyes that came to section were those in which the condition was far advanced. If opportunities offered for examining eyes in early stages of glaucoma, other conditions might be observed.

Observation tended to show that certain eyes were predisposed to glaucoma, fortunately comparatively few, while others did not develop it however much they might be provoked, or insulted. It was possible that an eye so predisposed might long remain healthy, but would develop hypertension when certain changes developed in its vascularity, or in its nervous influence. It has been taught that the acute or congestive type of glaucoma was different in kind from the socalled simple glaucoma, in which the earlier clinicians were unable to detect any increase in tension. But the study of cases with the modern tonometer and the careful observation of the central fields seemed to show that the difference was one of degree and not of kind. The simple glaucoma, if neglected, or if conditions favored it, might develop into a congestive or acute form. Such favoring conditions might be nervous influences, such as would be brought on by anxiety, worry or grief; and if to these should be added congestion of the uveal tract from any cause, an acute congestive attack might be precipitated. Therefore, clinically, it should concern the profession to discover by careful examination the non-congestive cases, at a time when they are more amenable to treatment.

Dr. C. W. Hawley complimented all three of the readers on their papers. He had advocated in this Society several times Dr. Wilder's theory that he was inclined to look for something besides the mechanical end of glaucoma. He had reported five cases due to autointoxication before the Pacific Coast Society, which were cured by treatment of autointoxication; and had one case under treatment at present which illustrated the very point Dr. Wilder stressed, that one must go back of the mechanical end to find out why glaucoma exists. In a case of nephritis under his observation, the glaucoma had markedly improved by improving the kidney condition,and he had spent considerable time in the last several years in looking after that end of it. He expressed the hope that someone would go further with it.

Dr. E. V. L. Brown said that he had recently used the slit lamp on twenty simple glaucoma eyes at the University of Illinois clinic; and in nineteen of them more or less pigment was found upon the back of the cornea, raising the question as to whether the tension was really not secondary to low grade uveitis as contended by Malling.

Dr. Richard Gamble referred to a case seen recently—a woman in her second attack of acute congestive glaucoma, which had come on following an attack of gall stones. Tension was 75, pupil markedly dilated, an unusually severe attack. He injected about 10 minims of 1/1000 adrenalin subconjunctivally. She had a general reaction. She had to sit up in order to breathe, pulse was rapid. The pupil dilated within several minutes ad maximum. Tension could not be ascertained the same day, because her general condition was not very good. They did not expect to get much lowering of tension or contraction of the pupil with miotics. But two days later the tension was 50, the pain was gone and the pupil was smaller than before the injection. He believed that the adrenalin was quite a factor, altho the patient had been on miotics for those two days.

Clarence Loeb,
Corresponding Secretary.

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RETINAL VENOUS THROMBOSIS.

Beginning twenty years ago Coats and Harms each published a series of papers on the pathology of vascular disease in the retina, that never made the impression upon the thought and practice of ophthalmologists that their character and importance would have justified. Perhaps the fact that they approached the subject from the side of pathologic anatomy, and were based largely on microscopic examinations of eyes removed at late stages in the course of the disease, prevented them from awakening a proper interest in the subject. For at that time ocular pathology had not impressed many students with its interests and importance, as it has begun to do in the last few years.

The monograph of R. Foster Moore, noticed elsewhere in this issue, approaches the subject from the clinical side, or from all clinical sides, and should draw to retinal venous thrombosis more attention than it has heretofore received. Venous thrombosis is interesting for the effect it has on vision. However the visual impairment, in contrast with that of arterial obstruction in the retina is often slight; and even when great, may be temporary. Changes in the visual field are important and generally in close relation with the evident vascular changes. The ophthalmoscopic appearances, tho not often so general as those of arterial obstruction, may continue to be notable and may vary for many months or years.

The most common general cause, Moore finds, is angiosclerosis. Locally the thrombosis is brought about in the tributary veins by the clogging of the blood stream, where the vein is crossed by a rigid artery. In the central vein constriction of the vein where it passes thru the lamina cribrosa, is probably a causative factor. However, the seat of the thrombosis in one of the temporal branches in 92 per cent of Moore's cases, and in the upper temporal branch in 70 per cent, seems to call for some special explanation, that is not yet forthcoming. Influenza must be accepted as an important cause; and while it would appear to be general in its influence, some local lesion of the affected vein seems to be a necessary supposition. The same may be true of other acute and focal infections, sometimes associated with venous thrombosis.

Hemorrhage is an important symptom, almost always present, tho it is conceivable that an incomplete thrombosis of a branch might exist without causing hemorrhage. A most striking feature is, that these hemorrhages may recur over many years. Moore reports nine cases, in which hemorrhages were found from 6 to 21 years after the veins became thrombosed; and in other cases retinal exudates were present after similar periods.

The obstruction in venous thrombosis is likely to be partial and variable, in which case the field will be mottled with patches of obscuration and islands of clear vision, which quickly shift their location while the limits of the peripheral field and of the blind spot remain normal. Such a field, when present, may be regarded as pathognomonic. In the same way the central visual acuity may vary from day to day, or from hour to hour and be distinctly modified by influences affecting the general circulation.

Altho in some cases vision is entirely restored to normal after thrombosis of a tributary vein, it may leave part of the field impaired. Partial thrombosis of the main trunk may also be followed by complete recovery, but in the large majority of cases there will remain some permanent visual defect, and in a good many the ultimate outcome will be practical or absolute blindness. E. J.

FOCAL AND OBLIQUE ILLUMINATION.

The examination of the anterior segment of the eye, as described in the older textbooks, using a condensing lens and a magnifying lens, was the direct lineal predecessor of the present microscopy of the living eye. Many of the things now revealed by the latter method might have been seen by the earlier, if it had always been used with the same skill and careful attention to detail. This has been pointed out by Butler, (B. J. O., v. 8, p. 561). The Coddington lens easily gives a practical magnification of 15 diameters. A large planoconvex lens of 7 cm. focal distance held with the plane side toward the eye gives, from a concentrated lamp filament, an adequate illumination. For monocular vision such means bring out most of what is seen by the elaborated "slit lamp corneal microscope" when used with the lower powers, most useful for clinical work. Even up to 10 diameters binocular vision could be used with a plano-convex magnifier of large diameter, or the older binocular or spectacle magnifiers with combined prisms.

The difficulty was that too many of us had not been trained to a practical understanding of the optical principles we had to apply in the examinations by focal illumination. Too frequently the examinations were made without any attention to the best focussing of the magnified image of the cornea or iris, and the reduction to a minimum of the spheric and chromatic aberrations of the lenses in our hands. Too often the necessity of avoiding general illumination of parts not under examination was neglected, or the necessity to give sharp contrast by adjusting the condensing lens so as to give a beam sharply limited at its margin, was not appreciated. Or the portions of the beam free from the effects of chromatic aberration have not been chosen, when accurate color discrimination was needed. There is danger that lack of understanding of the optical principles involved, especially those that are important in regard to illumination will limit the application and benefit of the new methods of examination.

The microscopy of the living eye has been developed by improved illumination more than by any change in its magnifying apparatus. At all stages, the practical value of microscopy has depended quite as much on the illumination of the field, as upon the perfection of lenses that formed images of the part seen. The lens combinations of the microscope were carried over into study of the living eye, before the perfecting of the illuminating apparatus for this special purpose was seriously undertaken. The latter process has not yet been wholly perfected, altho great progress has been made in the invention and adaptation of mechanical devices for the purpose.

In this rush of mechanical development, scientific principles must not be lost sight of. Gullstrand has developed this phase of applied optics to a high degree. Henker has carried it into accurate practical applications; and the mechanicians have a good understanding of the needs of this branch of scientific observation, from their standpoint. There is also need that workers with the modern apparatus should appreciate the optical principles involved, should study carefully their own needs as they arise in actual conditions of clinical work, and should point out to instrument makers just what these needs are, with suggestions as to how they should be met.

The mechanical arrangement for the illumination of the living eye may always be somewhat elaborate, as are those needed for the correction of the aberration of the lenses used for magnification in the microscope or telescope, or for producing accurate images in the photographic camera. But the mechanical adjustments by which the instrument is operated must be simplified, and adapted to the primary coordinations of the operator. For instance, Graves, (A. J. O., v. 8, p. 8) emphasizes the importance of the glass top of the table; on which the corneal microscope may be pushed to or from the examined eye, or to the right or left, or twisted to face it from a different direction. Such a top should replace the heavy mechanical slides on which the microscope now commonly rests. In much the same way the aspheric lens held in one hand gives a freedom of adjustment of light, far more easily and rapidly attained than is possible with the mechanical slit lamp devices. Some such improvements must be made in the corneal microscope and its illuminating apparatus before it can successfully compete with the older methods of focal illumination and inspection thru a single convex lens. E. J.

BIOMICROSCOPY.

The phrases, "microscopy of the living eye," and "examination of the eye with the corneal microscope," are much in use. See the papers of Bedell, Von der Heydt and Graves in this and preceding issues. A single word is needed to designate this method of examination. To call it the "slit lamp" examination uses two words instead of one, or descends to a barbarism in language and is suggestive of a temporary phase of development. For the use of the original Nernst slit lamp, is already past and it is probable that the slit diaphragm on the "nitra," or other lamps, will be largely replaced by the small circular opening on the "point-o-lite" lamp or its successors.

Bio-microscopy (hyphenated here to suggest the pronunciation) is truly significant, so far as derivation from classic roots can make a word significant; is brief as a word can be to carry such significance, is euphonious and has not been associated with any other meaning. Its significance is broad enough to include any future change of instrument, method or details. It fixes attention on the essential character of the examination of living tissues with the microscope; and if its application is widened to include other such examinations as studies of living blood cells, epithelium or microorganisms, its application in ophthalmology cannot be confused by giving it thus the most general meaning possible. It will simply be a new department in medical science in which, as often before, ophthalmology has led the way.

E. J.

BOOK NOTICES.

Helmholtz's Treatise on Physiologic Optics, Translated from the Third German Edition. Edited by **James P. C. Southall,** Professor of Physics in Columbia University. Vol. II, The Sensations of Vision. Cloth, large 8 vo., 488 pages; 3 plates, 2 in colors, and 84 illustrations. Published by the Optical Society of America, 1924.

For sixty years Helmholtz' Physiologic Optics has been the most important treatise on this basic subject of ophthalmology; yet only now is a translation appearing in English. Our notice of the first volume was pub-

lished in November last, (v. 7, p. 884) but already the second volume is being sent to subscribers. It is to be hoped that the third volume, which will complete the work, will also be ready for distribution in a few months. The delay of the English publication of the work has been due more to its greatness than to anything else, to the difficulties of getting such a unique treatise accurately translated and properly edited, and to securing for such an undertaking adequate financial support.

But now that it has appeared there is this satisfaction to be taken by its backers and those who want to use it; the work of translators, editors and printers has been well done. It is the best and most complete work on the subject that has yet appeared. As a sample of book making it compares favorably with others put out at the same price, seven dollars, per volume, in these days of typographic unions and the "well organized" manufacturers of paper. It is not to be obtained thru the regular commercial channels of the book trade, but should be ordered thru the Secretary of the Optical Society of America, Prof. F. K. Ritchtmeyer, Cornell University, Ithaca, N. Y.

To most medical readers the second volume will prove more interesting than the first because it has fewer algebraic formulas than the first. Indeed, except for about 30 pages devoted to refraction of simple colors by prisms such formulas are few and these referring to refraction by plane or spheric surfaces are simple, as compared with those in the first volume, that present the advanced or generalized theory of refraction as developed by Gullstrand. This volume deals largely with color, stimulation by light, physical and chemic changes in the retina, electric and nerve currents, intensity of sensations, sensitivity, contrast, subjective visual phenomena, visual purple, adaptation, twilight vision, the "duplicity theory," normal and anomalous color systems and theories of vision. In brief it is the part of the treatise which deals with physiologic optics in the narrower sense, coming closer to the nature and significance of the symptoms of ocular disease, especially disease of the retina, and the interesting subject of color blindness.

Thru all these chapters the superiority of the original exposition by Helmholtz seems to have inspired his successors, editors and translators to preserve the clearness and directness of expression as has rarely been done in other monumental works that have come to us thru many minds and hands. Two striking sections that are original in this edition are: A brief note by von Kries on the theories of contrast put forward by Helmholtz and by Hering, and the late experiments and criticism by Jaensch, which seems to bring the most rational view of today very close to that first put forward by Helmholtz. A chapter on the nature of color sensations is added by Christine Ladd-Franklin. This latter addition brings out most clearly the conception of the color sensations that fits in with our modern understanding of the organic development of the race. In this chapter is to be found a happy characterization of the general value of the Helmholtz Treatise as it appears in English, "Some of the facts here recorded will, it is true, have been superseded by later work, but on the other hand much will be found in it which has been, by accident, simply overlooked in later times. The scientist in the subject of physiologic optics will therefore be amply repaid if he reads this translation, and not simply secures it for his bookshelves."

One of the color plates illustrating the solar spectrum as it appears to one with normal color sense and as it appears to the completely color blind, is used as a frontispiece. The other color plate shows the appearance of Haidinger's polarization brushes and other subjective appearances. The most of the illustrations are explanatory of apparatus, or reproductions of graphs. Helmholtz' treatise becomes at once a book of reference for all students of ophthalmology who can gain access to it. We wait with interest the publication of the final volume.

E. J.

Principles of Ophthalmoscopy and Skiascopy. G. F. Alexander, M.B., C.M., Edinb., New Castle, England. Buckram, 80 pages, 30 illustrations. London, J. and A. Churchill.

Most books on the ophthalmoscope, or shadow test, avoid strict algebraic demonstrations, or statements of the theoretic basis of the instruments and their use, relying rather on verbal and geometric presentation of the facts to be presented. The student taught this way, if he has some interest in the principles of optics, is often puzzled as to where to turn for the mathematic presentation of these facts that will help him to fill the gaps that have been left by his training along the usual lines. The information to be sought elsewhere in large volumes is here condensed in a few pages, so that attention may be concentrated on the line of thought the reader is desiring to follow.

This does not mean that the gaps can here be filled unless there has been fair previous training in the rudiments of mathematics. But it is a great convenience to find on one page the demonstration we have often seen spread over a half dozen. It will still require concentrated attention, and careful procedure from step to step and formula to formula. But the undertaking does not seem so formidable and discouraging, even tho the mastery may take almost as much time, and the same learning and carrying in mind of the significance of each algebraic symbol.

The book is divided into two parts, the first explaining the principles of ophthalmoscopy, the second those of "photo-skiascopy," a term that emphasizes the fact that it is both light and shadow that we watch, or the boundary between them, in using the socalled shadow test. Each part is divided into chapters, and a mention of what is contained in each, gives an idea of the scope of the work.

In the first part, Chapter I, on "the simple convex refracting system" includes conjugate and focal distances, points and images, magnification and the "reduced" and aphakic eye. II, on the correction of hyperopia and myopia, includes the difference in depth of two objects seen in the eye. III, on axial ametropia, includes the magnification of the fundus. IV, is on curvature ametropia; and V, on parallactic movements. VI, discusses the area of the fundus visible in the direct and inverted images.

In the second part, Chapter I, is headed skiascopy in the absence of astigmatism and spherical aberration. It takes up the illumination of the fundus and its movements, the luminosity and shadow and their relative dimensions and variation in brightness of luminosity and density of shadow and rate of movement. Then it considers the correction of hyperopia and myopia. Chapter II, skiascopy in the presence of regular astigmatism, considers first the refraction of a spherocylinder and then the correction of ocular astigmatism. Chapter III, skiascopy in the presence of spherical aberration, takes up the nature of spherical aberration and then the ocular phenomena due to spherical aberration and the correction of ametropia in the presence of such aberration. Chapter IV deals with what are called the "transformation" movement, the "light scissors" movement, the "shadow scissors" movement and the correction of ametropia in these cases.

In the last two chapters algebraic formulas are dispensed with, as they must be where practically each case would require a distinct formula of its own. But the explanation given in the text is supplemented by diagrams that do throw light on the general associations of the light and shadow movements. This book will be welcome to those who feel the need of a better understanding of the formulas commonly used in mathematic optics.

E. J.

Ophthalmo-Optical Manual, by **William Swaine,** B.Sc., Lecturer in Physics, West Ham Municipal Technical College. Cloth, 12mo., 156 pages, 26 illustrations, 15 tables, London, The Hatton Press, Ltd.

The position held by the author of this book indicates the point of view from which he has approached the subject of the optics and physiology of the eye, and from which this excellent little work has been written. It is not that of the anatomist or physiologist, of the medical student or the surgeon taking up Ophthalmology as a specialty. If the medical man were going to have but one book on the subject, he would not choose this one. But if he has studied one of the elementary works on refraction commonly recommended in medical schools, the fact that this work is different adds greatly to its value.

The preface says: "The book is intended to be elementary, practical and non-mathematical, to suit the requirements of student-workers in ophthalmic optics. Half the book is devoted to the action of spectacle elements, measurements, transpositions, etc.; the other half deals with the optical action of normal and optically defective eyes, sight-testing and correction. The results of mathematical computations, statistics, etc., have been collected in a series of tables at the end."

The eye and vision occupy 19 pages, the action of lenses 52. The former has been taken from books, the latter is based on actual acquaintance thru experiment and teaching. "Retinoscopy, Skiametry," or the "Shadow Test" has 9 pages. Ophthalmoscopy and preliminary examinations of the eye 6, "Frames, Mounts and Elements" 10 pages.

This last chapter is arranged under these headings: general, frames, positioning measurements, comfort measurements, centering of lenses, measurements of the face, pince-nez, spectacle lenses, manufacture, and bifocal lenses. These are things that the oculist generally leaves to the optician, too exclusively. If oculist and optician are to continue to serve the public, they must understand each other's purposes and problems, by some mutual understanding of the service required outside of the limited sphere that either works in. This book is valuable in helping to such an understanding.

There is a great deal condensed into its pages. It is much better illustrated than the small number of figures seem to include from 2 to 10 diagrams grouped to interpret each other; and altho they are small they are sufficient to tell the story. The 15 tables are all valuable. They contain such information, as: Index, position and powers of the schematic eye, effects of decentration and tilted lenses, magnification, presbyopic accommodation and corrections, axial length of the eyeball in ametropia, and statistics of ametropia in various countries—information that is as valuable to the oculist as to the optician and too often not to be found in the text books.

E. J.

Retinal Venous Thrombosis. A Clinical Study of 62 cases. **R. Foster Moore.** Paper 8vo., 90 pages. Illustrated by 32 figures and 31 charts. London. Geo. Pulman and Sons, Ltd., London, 1924.

This Monograph presents the best account of a condition neglected in our text books. It is based on a study begun when Mr. Moore became Lang Research Scholar at the Royal London Ophthalmic Hospital in 1913. It would have been published earlier but for the war. The delay caused some of the cases to disappear so that they could not be traced. But, on the other hand, it has been made possible to follow some of the cases 11 years after identification of the thrombotic condition.

It begins with a tabular presentation of the cases. Then it takes up the symptoms, the causes of thrombosis and the changes which occur in the veins subsequent to thrombosis; discriminating between those in which the venous trunk is involved and those in which the lesion is in a tributary vein. In this part are introduced some 18 sketches showing the changes of form observed in the veins in these

cases, and indicating the areas of altered appearance of the retina. The changes that occur in the veins on the disc subsequent to central vein thrombosis, as seen with the ophthalmoscope, are next described and after these retinal hemorrhages associated with venous thrombosis and their retinal exudates.

Under visual acuity two tables are given; one of visual acuity in thrombosis of tributary veins, the other of thrombosis of the central retinal vein, each table giving the acuity at an early and a late period. Then the fields of vision are taken up and illustrated with 29 field charts; after which comparative readings of the tension in the affected and unaffected eyes are given in 3 tables. Studies of the blood pressure in these cases are reported; and of the effects of mydriasis on the intraocular tension. Cases of acute glaucoma following central vein thrombosis of which there were 7 observed, are the subject of comment; along with 4 cases in which venous outflow was markedly obstructed without thrombosis and 2 cases of insidious glaucoma and changes in the optic disc. All these points are commented on or discussed as well as the prognosis as to life in these cases.

The above details of Moore's monograph have been dwelt upon to bring out the extremely valuable character of this contribution to our knowledge of thrombosis of the retinal veins; and also because it illustrates what such a study may be and the many sides from which a case may be approached for its careful clinical study. We welcome this illuminating addition to ophthalmic literature.

E. J.

Transactions of the Ophthalmological Society of the United Kingdom, and Affiliated Societies, Vol. XLIV, Session 1924, with list of Officers, Members, etc. Cloth, 504 pages, 18 plates, 1 in color; and 43 illustrations. London, J. and A. Churchill.

This volume compares well for interest with any of the 43 that have preceded it. In style and arrangement it follows closely its predecessors. The titles of the different communications it contains are included under their appropriate headings in current literature. Here may be mentioned a few features of outstanding importance.

The symposium which opens the transactions of the annual meeting occupies 45 pages. It is upon the Physiology and Pathology of the Pupil Reactions. The opening papers for it includes one by Sir John H. Parsons on the physiology; one by Prof. Bramwell, speaking as a physician; one by R. Affleck Greeves on the pupil from the ophthalmologic point of view; and one by W. B. Inglis Pollock on experimental work; while R. Foster Moore reported a group of 7 cases presenting what was not the Argyll Robertson pupil altho simulating it. S. S. Meighan reports two cases of relapsing traumatic vesicular keratitis; in one of which the eyeball was excised, and examined histologically; and M. S. Mayou discusses the pathology of punctate keratitis with especial reference to the role of agglutinins. The section on disease of the lens is a fair sample of the contents. T. H. Butler contributed a paper on the anatomy of the normal lens as revealed by the slit lamp; J. Rowan one on iridectomy for lamellar or nuclear cataract; W. B. I. Pollock discusses early capsular discission after senile cataract operations; and G. F. Alexander the advantages of using a strong atropin solution with removal of cataract.

The proceedings of the Ophthalmological Society occupy 275 pages, while about 220 pages are used for the Scientific proceedings of the affiliated societies. The Oxford Congress proceedings open with a discussion on the general principles of the treatment of convergent concomitant strabismus, excluding the details of operations. The opening paper was by E. Landolt of Paris, followed by one from W. Ernest Thomson of Stirling, Scotland. The program of the Congress was enriched by papers from three Americans, H. F. Hansell, H. Friedenwald and F. Park Lewis.

The Midland Ophthalmogical Society has devoted its time and space to

clinical work. There are 23 reports of cases and discussions thereon, and one meeting was given to a demonstration of slitlamp examination. The North of England Society which held five meetings in the year also devoted most of its time to demonstrations and brief reports of clinical cases, and their discussion. But we find in its transactions the discussion of orthoptic (properly placed) trial lenses, by Bernard Chavasse, with description of a trial frame for securing accurate placing of the lenses.

The transactions of the Irish Ophthalmological Society are more equally divided between formal papers, and carefully prepared case reports. Its annual meeting was held at Belfast in Ulster; but it is notable that most of the papers were presented by Members living in the Irish Free State. Evidently the Ophthalmologists of Ireland understand that the interests and purposes they have in common are more important then those which tend to divide them.

The Scottish Ophthalmic Club and the Ophthalmological Society of Egypt are not represented by transactions published in this volume.

Once more we are impressed with the fact that these "Transactions" are one of the most important volumes that any practitioner of ophthalmology can add to his library for frequent and immediate reference.

E. J.

Compiled Lectures on the Uveal Tract, Lens and Vitreous. By **Vernon A. Chapman,** M. D., F. A. C. S., Assistant Prof. of Ophthalmology, Marquette University Medical School, Milwaukee. Paper, 24 pages, 1 plate.

This pamphlet is compiled from the American Encyclopedia of Ophthalmology and other sources, with correlation notes and additions. It is not divided into formal chapters but rather by topic headings, such as Uveal Tract in General, Congenital Abnormalities of the Iris, Neoplasms, Injuries of the Iris, etc. The plate represents some different types of cataractous lenses.

The teaching of this brochure is what is generally recognized as sound. It is set forth clearly in words carefully chosen. The large page and rather small type makes it possible to include a good deal of detail, so that the medical student in general will find it contains a mass of information that compares favorably with most of the better current textbooks; and it must be particularly useful in the medical school from which it has emanated.

But perhaps the highest value of such a compilation lies in the grasp it gives the compiler of his subject. Any careful writer who produces such a monograph, whether he prints it or not, gets an insight and a mastery of the material he studies and brings together, an individual arrangement of the facts that can be attained in no other way. President March once wrote "to read without the pencil in hand is to dream." To pass in review the thoughts of others without giving them an arrangement and evaluation of one's own is a form of mental dissipation, but little removed from idleness. It is to be hoped many monographs like this will be written and the best printed. Such mental activity will surely be reflected in alert investigation and ripened judgment in practice.

E. J.

Semiologie Oculaire (Ocular Symptomology) by **Dr. Felix Terrien,** professeur agrégé a la Faculte de Médecine de Paris, Ophtalmologiste de l' Hôpital Beaujon. I volume in 8 de 240 pages avec 126 figures. (Masson et Cie, Editeurs).

A noteworthy commentary upon recent French medical literature is its similarity to American thought, going right to the point, bringing out the practical rather than the abstrusedly technical application of the subject—a contrast to the formerly much imported thought from over the Rhine. Such indeed are the writings of this author.

This is Volume II on ocular semiology, Volume I on the corneo-sclera being reviewed in September, 1923. This volume deals with the iridociliary

diaphragm, the uvea and its relations to the other parts of the eye and the general system from the standpoint of disease symptoms. A similar plan as in Volume I is followed by giving the anatomy, physiology and pathology of the tissues under consideration. After consideration of the anatomo-physiologic phases his point of view is essentially clinical: for instance; in commenting on the iris and the pupil he takes up the mechanical and motor functions, the influence of secretions and the nervous system, the nutrition and the first symptoms of functional troubles, an original and complete study of the pupil with its relations to general conditions (especially its reflexes) to the structure of the globe and refraction, the different diseases where changes in the pupil are observed in opacities of the lens, hemorrhages in the vitreous and detachments of the retina, iritis and iridochoroiditis in which changes of the pupil are to be observed.

Inflammations comprise the third chapter, an original portion of which is that on gonococcic iritis, meningococcic iritis and serotherapy.

In studying the manifestations of tuberculosis the author shows how to control tuberculin therapy. The reason for the sudden appearance of the ocular syndrome is that the general disease immunizes against tuberculin but not against the tuberculous process. The main value of tuberculin in eye affections is to establish a diagnosis.

The book concludes with the semiology of contusions, tumors and malformations of this region—discussing increased intraocular tension (glaucoma) and decreasing hypotony, (ophthalmomalacia); questions of great interest which should be better understood by the profession. H. V. W.

Fifty-fourth Annual Report of the Herman Knapp Memorial Eye Hospital, for 1923. Paper, 24 pages and frontispiece. New York, 1924.

This is probably one of the best of the old fashioned annual hospital reports, which are supposed to keep donors and benefactors in touch with the work to which they are contributing. Its scientific value lies chiefly in the statistics of diseases encountered and operations done for their relief. Those here given are probably among the best we have for accuracy and significance. They cover 11,008 cases seen in the dispensary and 919 cases treated in the hospital. The operations done numbered 993.

It is interesting to find here the outlined course of the School of Ophthalmology that has been conducted successfully thru the year. A graded course of instruction is given to classes limited to six each, continuing for eight months. These classes are started three times a year. The schedule shows about 5 or 6 hours of instruction daily for 6 days in the week; given by 14 different instructors and covering well the field of ophthalmology. In this, and a half dozen other institutions in America, more systematic, complete and well balanced courses are now given, for the training of ophthalmologists for practice, than we believe are given or ever have been given in Europe.

E. J.

Peking Union Medical College, Annual Announcement, 1924-1925. Paper, 134 pages, Peking.

This institution, supported by the China Medical Board of the Rockefeller Foundation, is carrying western medicine to the millions of the Far East. It is interesting to find requirements for admission, mathematics in advance of elementary algebra and geometry, including "work in plane trigonometry and drill in the use of logarithms." Such a requirement in American Medical Schools would furnish more who were prepared for the graduate study of ophthalmology; and render their work more fruitful. In the department of ophthalmology four "elective courses" are given; one on Refraction, including retinoscopy or ophthalmoscopy; one on Ocular Muscles and Ocular Movements; one of four weeks given in the Chinese language (most of the instruction is given in English) and one on clinical demonstrations in the out-patient clinics, which would be classed as a practitioner's course.

E. J.

The Distribution of Physicians in the United States. By **Lewis Mayers** and **Leonard V. Harrison.** Paper, 12 mo., 210 pages with 25 tables and 2 maps. New York City, General Educational Board, 1924.

This is a study, especially as to the relative distribution of physicians, as between towns and rural districts. There has of late years been a decided movement of physicians from the country to town and city, with a numerically inadequate replacement in villages and rural communities by recent graduates in medicine. The attention of Deans of Medical Colleges, State Health Officers and others, has been called to this shifting of the profession, by local officials, real estate agents, and instances of hardship or death from delay, or impossibility of obtaining effective medical or surgical assistance.

This report gives the results of a study of the facts in selected parts of twelve states, from Maine to Alabama, west as far as Iowa and Missouri, and in California and Washington on the Pacific Coast. In all of these localities there has been an increase of the average distance between places having physicians. In all of them there has been a decrease of physicians in towns of less than 1,000. But with this there has generally been an increase of physicians in cities of over 50,000.

To account for these changes, it is found, that while cities and large towns have practically all grown in population, there have been rural counties in every state in the Union, except Arizona, in which there has been decreases in population, between 1910 and 1920; and in some states the counties showing decrease of population constituted a very large part of the state.

Then good roads, automobiles, and telephones made it possible for one physician to serve more people, sometimes estimated at four times as many. But in the season of bad roads, this increased efficiency is cut down everywhere, and entirely neutralized in some places. During epidemics and sudden emergencies, the reduced number becomes inadequate.

The shortage of medical service has been blamed on higher medical education and the refusal of recent graduates to go to rural locations. But the facts seem to show that this is an unimportant cause, certainly that a lowering of educational standards either for the profession as a whole, or to produce a special standard class of practitioners for rural service, would not be justified. The tendency to specialism has been blamed for this condition. Certainly specialism in practice only becomes possible where a sufficient community to support them is within reach of all the physicians who have thus specialized. But specialization has come to meet the public demand for the improved service that it makes possible.

These are some of the interesting points brought out by the studies recorded in this volume. There are many others, and the writers on this subject will find the twenty-five tables and two maps contained in the appendix a perfect mine of information with regard to this change of professional conditions, and the many important economic questions that influence the course of events. The valuable contents would have been more readily available if an index or table of contents had been supplied.

The book is worth reading thru, but some may wish to consult it with regard to particular points, who have not the time to read. And those who read it are compelled to do their own marking and indexing if it is to be fully available for their future reference and use.

E. J.

CORRESPONDENCE.

Papers for the London Convention.

To the Editor: Those wishing to contribute papers to the Convention of English Speaking Ophthalmological Societies should send in the titles of such communications to the Secretary of the Scientific Business Committee, Mr. R. Foster Moore, 91 Harley Street, W. 1, London, England, and need not wait for an invitation.

The circular giving all particulars of the Convention has been printed and will shortly be circulated.

E. Treacher Collins.

London, England.

Marginal Dystrophy of Cornea.

To the Editor: In some way the illustrations in an article by me "Marginal Dystrophy of the Cornea" were wrongly labeled which makes them rather puzzling. Figure 2 was exchanged for Figure 4 so that what was labeled as Figure 2 should illustrate Case 2 and Figure 4 illustrated Case 1. Also another misprint occurred, it being stated on page 20 that "the present 47 cases make a total of 559" which should have been "the present 7 cases make a total of 59."

I will greatly appreciate it if you will publish this correction.

Sincerely yours,

Omaha, Nebraska. S. R. Gifford.

ABSTRACT DEPARTMENT

Reprints and journal articles to be abstracted should be sent to Dr. Lawrence T. Post 520 Metropolitan Building, St. Louis, Mo. Only important papers will be used in this department, others of interest will be noticed in the Ophthalmic Year Book.

Johnson, Lindsay. Theory of Accommodation. Archiv. of Ophth., Sept. 1924.

Lindsay Johnson found from anatomic examination that the ciliary processes do not touch the capsule of the lens, that animal experiments on the suspensory ligament do not flatten the lens, that the ciliary muscle does not cause the capsule to relax and allow the lens to bulge forward. He proposes a new theory of accommodation as follows:

"Between the suspensory ligament and the hyaloid membrane covering the vitreous is a tiny triangular space, sometimes called the Canal of Petit. This is bounded internally by the capsule of the lens, externally by the ciliary processes, behind by the hyaloid and vitreous and in front by the suspensory ligament.

"What happens during the act of accommodation is as follows: The two ciliary muscles (the radiating and the circular muscles) contract and their combined action drags forward the choroid and at the same time squeezes up the ciliary processes and pushes them into the circumlental space with the help of the circular muscle of Müller. This tends to compress the fluid in this space. But fluids are incompressible, so something has to give way. This can only be the capsule, which is forced inwards, compressing the lens round its circumference and thus causing the two surfaces to bulge. Now the posterior surface cannot be displaced backwards because it rests against the incompressible vitreous. So it must bulge forward. But here it presses against the equally incompressible aqueous. Around the angle between the base of the iris and the cornea are a number of spaces or clefts between the fibrous tissue, known as the spaces of Fontana. There is also a tiny circular canal known as the canal of Schlemm. Now when pressure is put onto the fluid in the circumlental space, as the lens cannot bulge backwards because there is no outlet for the vitreous, it must bulge forward. This is effected by some of the aqueous flowing into these spaces of Fontana; in fact, that is the reason for their being there. The moment accommodation is relaxed the fluid runs back again into the chamber. In order to prove that, I injected with a fine syringe a few drops of methylene blue into the aqueous chamber of an albino guinea pig. Then I carefully watched the result thru the ophthalmoscope, and when the eye accommodated, I distinctly observed the blue color stream away thru the spaces in the angle and return again immediately afterwards. Hence the increased curvature of the front surface of the lens is affected by hydraulic pressure in the way I have indicated and not as Helmholtz affirmed."

H. V. W.

Handmann, M. Complete Subsidence of a Traumatic Cyst of the Iris after Roentgen Radiation. Klin. M. f. Augenh., 1924, v. 72, p. 11.

Two small cysts developed at a corneal scar which remained after the extraction of an intraocular piece of iron. These cysts were destroyed by cauterization. Apparently this was too superficial and did not remove the epithelium in the depth, which led, by continuity, to the formation of a large cyst of the iris, occupying the upper nasal quadrant of the anterior chamber. Within a month, four Roentgen radiations of 20 minutes, were applied without visible results, but after three months, the cyst became smaller and after ten months had entirely disappeared.

C. Z.

Blatt, Nicolas. Primary Anthrax of the Eyelids. Graefe's Arch. f. Ophth. vol. 3, Part 1 and 2, 1923.

The author had the opportunity of observing 10 patients, in 1922, during an anthrax epidemic, of whom 3 presented a primary infection on the right upper lid. These 3 patients further presented very serious general symptoms. The infections of the eyelid showed peculiarities with regard to form and evolution. Whereas the other cases presented the typical characters of the malignant pustule, in the case of the eyelids there developed a diffuse, edematous inflammation, because the loose skin and subcutaneous tissue offered insufficient opposition to the process of invasion.

Four stages could be differentiated in the evolution of the disease. In the first stage one notes redness of the eyelid with itching and a burning sensation, but without actual pain. The eyelid continues to swell. While general symptoms of alarming gravity develop, the preauricular and submaxillary lymphatic glands increase in size and the edema extends towards the temporal region and downwards over the face. The skin develops a livid hue. The second stage is characterized by the formation of necrosis in the superficial and deeper tissues of the eyelid, which takes the form of a dark brown to black slough. During the third stage the general symptoms begin to abate, while a purulent line of demarcation limits the slough. The slough is cast off and there remains a deep loss of substance with undermined and swollen edges. In the fourth stage the ulcer becomes cleaner and finally closes by a process of cicatrization or advances as the result of a moist gangrene which may extend to the bulb.

The development of the pustule at the same place, that is the right upper lid, in the case of all three patients, is explained by the fact that they had all been occupied in skinning animals that had died from anthrax and had been stung by the flies that swarmed about them. As the patients applied early for medical help it was possible to determine accurately the period of incubation which was 4 days in the two first cases and 5 days in the third. In spite of the deep anatomic changes the functional results were fairly satisfactory. The eyelids retained their normal position and their movements were little diminished. The absence of ectropion was accounted for by the fact that the scarring extended deeply into the subconjunctival tissue at the line of reflection and even to the periosteum. One case resulted in panophthalmitis. The general treatment is purely symptomatic. The author tried intravenous injections of neosalvarsan and is convinced of the efficacy of this treatment so far as the general state is concerned. The local manifestations do not seem to be affected by neosalvarsan. The l o c a l treatment must be entirely conservative, consisting in moist compresses and fomentations with weak mercurial lotions.

ST. JOHN.

Blatt, Nicolas. Ocular Changes Resulting from Snake Bite. Zeitschrift. für Augenh., vol. 49, 1923.

A woman, aged 40, was bitten on the bare foot by a common viper. The first symptoms of poisoning made their appearance after half an hour (drooping of the eyelids, diarrhea). These rapidly became more pronounced. Both eyes presented marked ptosis and accommodation paralysis. Vision, refraction, motility and fundus were normal. Pupils were dilated and rigid. Ophthalmoplegia diminished from the fourth day, the ptosis being more persistent. Snake poison produces diminuation of blood pressure thru the vasomotor center, which, in combination with increased permeability of the small blood vessels produces hemorrhages. In the present case these hemorrhages must be considered responsible for the ocular changes.

ST. JOHN.

Blatt, Nicolas. A Case of Blue Sclera, Fragilitas Ossium and Primary Epibulbar Carcinoma. v. Graefe Arch. f. Ophth., vol. 3, 1923.

The case is remarkable from the fact that the patient attained an advanced age and therefore belongs to the class

of osteopsathyrosis idopathica tarda. The patient was a woman of 52, who from childhood had had "blue eyes" and difficulty of hearing. In the course of her career she sustained a fracture of the ninth rib with dislocation of the shoulder, further a fracture of the left arm and one of the right thigh bone. Slight trauma was sufficient to produce repeated dislocation of the shoulder. At the age of 50, a slowly growing tumor made its appearance in the left eye. Examination showed that this tumor extended from the caruncle to beyond the edge of the cornea, presented the form of a shell, had a broad basis and was firmly fixed to the parts beneath. The surface was uneven, but not ulcerated, the color greyish white. It had apparently developed on an old pterygium. Removal of the tumor was easy; nowhere had it penetrated into the deeper parts. Histologic examination showed irregular epithelial masses, separated by stroma at the cut surfaces. The cells were partly cylindrical, partly cubical, but flattened types were also observed. A few giant cells, here and there karyokinetic figures were present. No regressive changes seen. Obviously, a case of epibulbar carcinoma of the basocellular type. In the patient's family, fragility of the bones, blue sclera and deafness were hereditary, but there was no disposition to the development of cancer. The author believes that the sclera, which in spite of its thinness possessed unusual firmness, must have prevented the tumor from proliferating into the interior of the eye, while the abundant blood supplied by the pterygium forming the base of the tumor, probably accounted for the absence of ulceration. The pterygium itself acted no doubt as an irritative cause in the development of the carcinoma.

ST. JOHN.

Watzold, P. Pathology of Congenital Opacities of the Lens. Klin. M. f. Augenh. 1924, v. 72, p. 76.

An infant of one month showed, a few days after birth, a yellow reflex from the interior of the left eye. The diagnosis of glioma of the retina was made by the attending physician and the eye was enucleated. The anatomic examination disclosed no tumor, but a pupillary membrane adherent to Descemet's membrane; anterior chamber almost abolished; spurious anterior polar cataract. The posterior surface of the lens was indented like a coloboma and the concavity was filled with partly vascularized connective tissue, in connection with a persistent hyaloid artery. In the parenchyma of the lens, three zones of cellular tissue could be distinguished. The author considers the tunica vasculosa lentis as primary from which embryonic connective, granulation tissue developed which acted as a foreign body for the lens and produced posterior and incipient anterior polar cataract.

C. Z.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. George H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph L. McCool, Portland, Oregon: Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo.; Dr. G. McD. Van Poole, Honolulu; Dr. E. B. Cayce, Nashville, Tenn.; Dr. Gaylord C. Hall, Louisville, Ky.; Dr. Edward D. LeCompte, Salt Lake City.

DEATHS.

Dr. Dwight Williams Hunter, New York, age seventy-one, died December twenty-second, 1924.

Dr. William McKay, New York, age seventy-four, died January seventh, of heart disease.

Dr. Conrad E. Koerper, Washington, D. C., age forty-seven, died November twenty-eighth last, at the Walter Reed General Hospital.

Dr. John Norman Risley, New Bedford, Massachusetts, age forty-eight, son of the late S. D. Risley, died December seventeenth, 1924, of pneumonia following influenza.

SOCIETIES.

At the December meeting of the Spokane County Medical Society Dr. Harry Vanderbilt Würdemann of Seattle, Washington, addressed the Society on the subject of "Protection Devices for the Prevention of Eye Hazards in Trades."

At the January meeting of the Section on Ophthalmology of the College of Physicians of Philadelphia, Dr. Burton Chance presented "A Sketch of the Life of Sir Isaac Newton." Messrs. Landis and Robertson, by invitation, read a paper on "The Bactericidal Powers of Aqueous of Second Formation. A Possible Explanation of the Beneficial Effect of the Saemisch Section." Lantern Slides. Dr. William Zentmayer presented "A Case of Membrana Epipapillaris" and "A Case of Probable Extensive Remains of Cloquet's Canal."

The Chicago Ophthalmological Society held its annual meeting January nineteenth. Eighty-six members and guests were present at the dinner, after which Dr. Edward Jackson of Denver, who was the guest of honor, gave a very interesting address on "Ophthalmology and Medicine." This meeting was especially notable because of the presence at the speakers' table of Drs. Cassius D. Wescott, Wm. E. Gamble and H. W. Woodruff, all ex-Presidents of the Society, and each of them having a son being received into the membership of the Society on this occasion. The following officers were elected for the ensuing year: President, Chas. P. Small; Vice-President, M. H. Lebensohn; Secretary-Treasurer, Robert H. Buck; Councillor, E. J. Gardiner.

The Kansas City Eye, Ear, Nose and Throat Society held its January meeting at St. Joseph, Mo. Dr. Harry Gradle of Chicago demonstrated the use of the slitlamp on cases of nebula of the cornea, iris anomalies, incipient and mature cataract and fundus lesions. Dr. Gradle also gave a talk on glaucoma and demonstrated his method of implantation operation for absolute glaucoma and his operation for keratoplasty. Dr. S. Iglauer of Cincinnati demonstrated plastic nasal work by operations. Dr. J. M. Patton of Omaha gave a diagnostic clinic on uveitis, lacrimal disturbances, muscle disturbances and glaucoma. Drs. Dean and Bunch of Iowa City demonstrated the audiometer in testing the tonal range.

The date of the Heidelberg Ophthalmologic Congress for 1925 has been advanced to August 3, 4 and 5th. This will permit American Ophthalmologists who had planned to attend the London Convention of English Speaking Ophthalmological Societies to take part in it, also, without the waste of time which the previous date would have entailed. This courteous act of the Congress should be met in the same spirit of international scientific friendship by the attendance of as many American Ophthalmologists as may be able to be present.

PERSONAL.

Dr. W. O. Nance of Chicago is spending the winter months in California.

Drs. A. Duane and J. W. White of New York announce the removal of their offices to 143 East 35th Street.

Dr. Joseph D. Lewis announces the removal of his offices from Minneapolis to the San Marcos Building, Santa Barbara, California.

The Governor of Montana has appointed Dr. John A. Donovan of Butte, a member of the State Board of Medical Examiners.

Dr. Robert Sattler has been appointed director of the department of ophthalmology for the ensuing year at the University of Cincinnati.

Dr. A. F. MacCallan has been elected Assistant Ophthalmic Surgeon to the Westminster Hospital, and also Assistant Surgeon to the Royal Eye Hospital, London, England.

Dr. Antonio S. Fernando has been appointed Assistant Professor of Eye, Ear, Nose and Throat in the College of Medicine, University of the Philippines.

Dr. H. T. Holland who recently returned to his home in England after several weeks spent in America, has been awarded an honor Gold Medal and the title of Kiser I Hind has been conferred upon him by the Indian Government, in official recognition of his work in Shikapur, India.

Dr. Moura Brasil, director of the General Policlinic of Rio Janeiro, recently completed fifty years of professional practice. The occasion was celebrated by the unveiling in the policlinic building of a brass plate containing his portrait. Special sessions will be held in his honor by the National Academy of Medicine and the Society of Medicine and Surgery.

MISCELLANEOUS.

The Jersey Eye, Ear, Nose and Throat Hospital, Jersey City, was recently opened.

The Brooklyn Home for Blind, Crippled and Defective Children was bequeathed $10,000 by the late Thomas D. Hurst.

The Peking Union Medical College has arranged a course in ophthalmology to be given in the Chinese language this year.

The Massachusetts Charitable Eye and Ear Infirmary, Boston, has changed its name to the Massachusetts Eye and Ear Infirmary.

The Boston Nursery for Blind Babies, under the will of the late James Brown, participated with a number of others in his very large estate.

At the Division of Medical Extension, University of Maryland, on January fifteenth, Dr. Wm. H. Wilmer spoke on "Certain Disturbances of the Hypophysis Cerebri as Evidenced in the Eye."

Volunteers engaged in transcribing books into the braille system for the benefit of the blind completed 5,784 pages of braille in the month of November, 1924. This marked the completion of fifty-eight volumes.

The New York Association for the Blind announces that plans have been prepared for a $250,000 building for settlement work among the blind, to be erected on the site of the old "Lighthouse" and an adjoining lot at 111 East Fifty-Ninth Street.

The Duluth News Tribune for December twenty-seventh, refers to a New York audience of twelve-hundred blind men, women and children who sat in a darkened theatre and saw their first motion picture. The reading of an atmospheric narrative with a rhythmic arrangement, together with special music, enabled the audience to conceive the story as it was unreeled on the screen.

Professor L. Koeppe of Halle Germany, well known thru his pioneer work in slit lamp microscopy, who has been living in this country for the last fourteen months, is to give a number of courses on slit lamp microscopy in different cities of the United States Rochester, New York, Boston, Cincinnati, etc.

The first two courses of the series have just been finished in New Orleans. All who participated in these two courses express their great satisfaction with the benefits derived.

St. Luke's Hospital, New York City, deeply regrets the resignation of Doctor Colman W. Cutler as its Attending Ophthalmologist. Doctor Cutler is recognized as a scholar and an authority in ophthalmology and it is fortunate that he is to remain as Consultant to the Hospital. Twenty years age he established the Eye Department at St. Luke's and called in Doctor Alfred Wiener from the New York Eye and Ear Infirmary as his Associate.

The faithful and unselfish and untiring service of these two men has developed an eye department of very high standard.

Doctor Wiener is peculiarly well fitted to succeed Doctor Cutler as he was primarily trained as a neurologist.

The present staff of the Eye Department at St. Luke's is: Colman W. Cutler, Consultant, Alfred Wiener, Attending, Isaac Hartshorne, Associate, Conrad Berens, Jr., Assistant, Chas. Littwin and Jas. F. Faulkner, Clinical Assistants.

Current Literature

These are the titles of papers bearing on ophthalmology. They are given in English, some modified to indicate more clearly their subjects. They are grouped under appropriate heads, and in each group arranged alphabetically, usually by the author's name in **heavy-faced type.** The abbreviations mean: (Ill.) illustrated; (Pl.) plates; (Col. Pl.) colored plates. Abst. shows it is in an abstract of the original article. (Bibl.) mean bibliography and (Dis.) discussion published with a paper.

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